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# Empirical Yields of Timber and Forest Biomass in the Southeast

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## ABSTRACT

Measurements and classifications recorded at 24,775 Forest Survey plots established randomly throughout the Southeast comprise a vast source of information on timber stand development. Empirical yield tables developed from this source are reported for major forest types in the Region. These tables also serve as guides to yields of forest biomass by tree size and species groups.

**Keywords:** Southeast, yield tables, forest biomass.

## Introduction

This Paper contains yield tables that show stand structure and development on Forest Survey plots in major forest types in the Southeastern States of Florida, Georgia, North Carolina, South Carolina, and Virginia. These yield tables were developed empirically from the average conditions observed on selected plots. In selecting the samples for construction of these yield tables, we screened measurements and classifications recorded at 24,775 Forest Survey plots established randomly throughout the Region. Only plots in timber stands classed as fully stocked by Forest Survey standards were used. The average yields shown represent a broader range of stocking and sites than is conventionally used in constructing yield tables, but they are reasonable guides to proven stand performance. These tables fill many of the voids in existing information on timber yields in the Southeast. In addition, they include the first comprehen-

sive guides to yields in the Region expressed in terms of forest biomass.

## Methods

Any good sample plot data may be used in the construction of empirical yield tables (Spurr 1952). Yield table construction requires an adequate sample from a specific forest type within the area or region to be served by the table. In general, stands are suitable for sampling when there are no recognizable factors measurably affecting growth other than those being evaluated: age, site, and stand density (Bennett 1966). Since the purpose of a yield table is to estimate productive potential rather than production based purely on stand history, the ideal method is to periodically measure carefully selected stands over the span of their development. This method is a slow, meticulous process that discourages yield table construction. We have attempted to use Forest Survey sample plots in the Southeast to shortcut the conventional method without violating acceptable standards.

In recent years, several mensurationists and resource analysts have probed the use of Forest Survey data to construct empirical yield tables (Cost and McClure 1982; Essex and Hahn 1976; Hahn and Raile 1982; Knight 1978; Knight and McClure 1981; Knight and Sheffield 1980). Although Forest Survey plots are neither designed nor intended for this purpose, they comprise a vast source of information on stand development across the full range of forest sites and conditions. Over the years, Forest Survey in the Southeast altered its procedures to accommodate this kind of use.

Field guides document the establishment and measurement of the Forest Survey samples plots used in this study. A copy of "Field Instructions for the Southeast, 1982" is available upon request. These field instructions also define the forest types included in this Paper.

### Stand Age

Stand age is one of the key data elements required for sample plots used to construct yield tables. Prior to 1963, Forest Survey in the Southeast did not collect stand age on its sample plots. Instead, it used stand-size classes--seedling-sapling, poletimber, and sawtimber--to monitor and describe stand development. Although Forest Survey added stand age in 1963, it was applied and recorded in 10-year classes. Furthermore, the 10-point-cluster sample plot used at the time was allowed to straddle two or more distinct stands.

Forest Survey in the Southeast corrected both of these deficiencies in 1973 at the start of the fourth inventory of North Carolina (Knight and McClure 1975). Since then, to the extent possible, stand age has been determined to the nearest year and the cluster sample plot has been confined to a single stand as identified by point 1. These changes opened up the opportunity to use Forest Survey plots in the Southeast to construct empirical yield tables.

Generally, timber stands in the Region are even-aged. Although many of the stands have been high-graded from time to time, there is very little true selection cutting practiced in the Region. The origin of most stands can be traced to regeneration following a final harvest, some natural disturbance, or the reversion of agricultural land to forest. Although the stands are perceived and described as even-aged, many of the young stands contain a scattering of older, residual trees from a former stand and some of the older stands contain significant numbers of understory trees and pockets of advance reproduction. Crews record the age of the most prevalent stand. The stand age specified in these yield tables is the midpoint of a 5-year class. For example, the 10-year age class includes stands 8 through 12 years of age.

### Site

Site is another key factor affecting timber yields. Forest Survey uses the height

and age of a dominant tree, representative of the prevalent species in a stand, as an indicator of potential timber yield. Forest Survey groups these sites into productivity classes, expressed in cubic feet of growth per acre, for fully stocked natural stands at culmination of mean annual increment. Each of these site classes spans a wide range of site indexes. In this Paper, high sites include all sites capable of growing 85 cubic feet or more per acre; medium sites, 50 to 85 cubic feet; and low sites, 20 to 50 cubic feet. Where a comparative range of site indexes is indicated, height at age 50 is the base for both planted and natural stands.

In this Paper, the yield tables are for high sites, medium sites, or all sites. Low sites account for less than 20 percent of the commercial forest land in the Region, and fully stocked stands occupy only a portion of these low sites. For most forest types, the sample of fully stocked stands on low sites is too small to construct yield tables.

### Density

Density is another critical variable in empirical yield tables. In this Paper, the yield tables represent fully stocked stands measured against the Forest Survey stocking standard applied in the Region. This stocking standard is summarized below and is also included in each of the conventional Resource Bulletins (Tansey 1983).

In the measurement and classification of the sample plots, crews tallied overtopped trees but these trees were not permitted to

### Stocking Standard

D.b.h. class (inches)	: Minimum number of trees per acre for full stocking	: Minimum basal area (ft <sup>2</sup> ) per acre for full stocking
Seedling	600	--
2	560	--
4	460	--
6	340	67
8	240	84
10	155	85
12	115	90
14	90	96
16	72	101
18	60	106
20	51	111

contribute to stocking. In screening out the plots used to construct these yield tables, the authors did not permit seedlings to contribute to the required stocking in stands 18 years or older. Saplings in the intermediate crown class were not permitted to contribute to the stocking requirement in any stand. In pine forest types, the stocking requirement had to be satisfied by yellow pine species. In hardwood types, all species were allowed to contribute to the stocking requirement. For all types, the stocking requirement had to be satisfied with growing stock; the stocking of rough and rotten trees was excluded.

### Merchantability Standards

By precisely defining our merchantability standards, we hope to avoid a weakness common in many existing yield tables. In our tables, all volumes expressed in cubic feet are solid wood; they exclude bark and all rotten and missing wood detected in the trees. The total aboveground volume includes all solid wood above the ground line in all live trees 1.0 inch in diameter and larger at breast height (d.b.h.), excluding the volume in twigs and lateral limbs smaller than 0.5 inch in diameter.

Volume of growing stock is the solid wood in the central stem and forks of all growing-stock trees 5.0 inches d.b.h. and larger from a 1-foot stump to a minimum 4.0-inch top diameter outside bark (d.o.b.). Growing-stock trees are live trees of commercial species that meet specified standards for sawtimber or will likely meet such standards when they reach minimum sawtimber size--9.0 inches d.b.h. for softwoods and 11.0 inches d.b.h. for hardwoods. Volume in the sawlog portion of sawtimber trees is the solid wood from a 1-foot stump to a minimum 7.0-inch top d.o.b. for softwoods and a minimum 9.0-inch top d.o.b. for hardwoods. This sawtimber volume is expressed in net board feet, based on the International 1/4-inch log rule. The technique used to measure standing trees for developing volume-prediction equations for tree species in the Southeast is documented and available upon request (Cost 1978).

In these tables, we define forest biomass as the green weight of aboveground wood and bark (excluding foliage) in all live trees 1.0 inch d.b.h. and larger. Foliage includes leaves, needles, buds, fruit, twigs, and lateral limbs smaller than 0.5 inch in

diameter. Studies by the Utilization of Southern Timber Research Work Unit at the Forestry Sciences Laboratory in Athens, Ga., provided the vital linkage between volume and weight (Clark 1979; McClure and others 1981; Saucier 1979).

### Screening

To construct these empirical yield tables, we developed special summary records for each of the 24,775 sample plots on commercial forests in the Southeast. These plot summaries include 20 screening variables, ranging from location to stocking. Next, we wrote a special computer program for screening and compiling these plot summaries into specified groupings. This computer program selects or excludes individual plot records using any specified combination of the 20 screening variables. The tables in this Paper are part of the output from the computer program.

### Discussion

We tried to validate the empirical yield tables developed from Forest Survey plot data by comparing them with other published information on yields. We reviewed numerous yield table studies and carefully examined the procedures used and the published results. In most cases, valid comparisons were impossible because of significant differences either in the procedures used or in the way the results were presented.

We established the following criteria for selecting an existing yield table for comparison: (1) the table should be based on a large sample of a well-defined forest condition over a broad geographic area, (2) the independent variables used in the table should be age, site, and stocking, (3) one or more of the units of measure should be comparable, and (4) the merchantability standards should be essentially the same as ours. With these criteria, the choice boiled down to the tables published by Schumacher and Coile (1960). From the host of yellow pine species contained in the Schumacher and Coile publication, we selected loblolly pine because it had the widest geographic range and a sample of 420 plots.

Although a few differences exist between the two data sets, these differences are small and could easily compensate for one another. For example, Schumacher and Coile estimated the cubic-foot volume of the

entire tree stem (inside bark) based on the height of dominant stand and 1.0-inch diameter classes. We computed the total aboveground cubic volume of sample trees individually using total height and actual d.b.h. Another minor difference between the two data sets involves the selection of the sample plots. Schumacher and Coile purposely selected even-aged stands judged to be well stocked, undisturbed by past cutting, and representative of a homogeneous site. The Forest Survey sample differs in that all plots used in a specific yield table were selected from the regionwide summary records by sequentially screening each plot through specific type, site, age, and stocking criteria.

Table 1 compares our results with those of Schumacher and Coile for natural loblolly pine stands in the Coastal Plain of the Southeast. From Schumacher and Coile, the cubic volume for the entire stand (inside bark, stump to tip) for site index 70 was compared with Forest Survey's total aboveground volume of southern yellow pine. Since the yields published by Schumacher and Coile

apparently excluded all hardwood volume encountered on the sample plots, any hardwood volume was excluded from the Forest Survey yields for the comparison. Since 100 percent or more stocking of southern yellow pine was required in the Forest Survey samples, any hardwood volume would likely be in small trees of tolerant species in the understory.

In the comparison, we first plotted the Schumacher and Coile yields for site index 70 over stand age and drew a freehand curve through the plotted points to establish a reference curve between 5 and 85 years of age. Next, we plotted the Forest Survey yields averaged by 5-year age classes and noted the number of samples in each average. Displayed in this manner (fig. 1), it is obvious the Schumacher and Coile curve is well within the central area of the plotted points throughout the range of the data.

This comparison leads the authors to conclude that Forest Survey data compare favorably with the highly respected yields developed by Schumacher and Coile. Since the

Table 1.--Comparison of yields for well-stocked, natural stands of loblolly pine on medium sites<sup>a</sup> in the coastal plain of the Southeast

Stand age (years)	Schumacher and Coile (entire stand)	Forest Survey (total aboveground)	Number of plots
		All species	
		Volume	Standard error
----- Cubic feet per acre -----			
5	--	77	40
10	--	717	155
15	--	1,254	137
20	1,690	1,694	83
25	--	2,311	128
30	2,540	2,452	82
35	--	2,659	153
40	3,100	2,714	139
45	--	3,018	102
50	3,460	3,636	181
55	--	3,270	264
60	3,720	3,367	451
65	--	5,351	--
70	3,910	4,060	--
75	--	3,591	205
80	4,050	2,763	247
85	--	4,295	--
		5,754	1

<sup>a</sup>Schumacher and Coile, Site Index 70; Forest Survey, Site Class 4 (Site Index 60-78).

other empirical yields presented in this Paper were developed by using methods similar to those used for loblolly pine, the

entire series should compare favorably when fairly tested against the results of other, good yield studies.

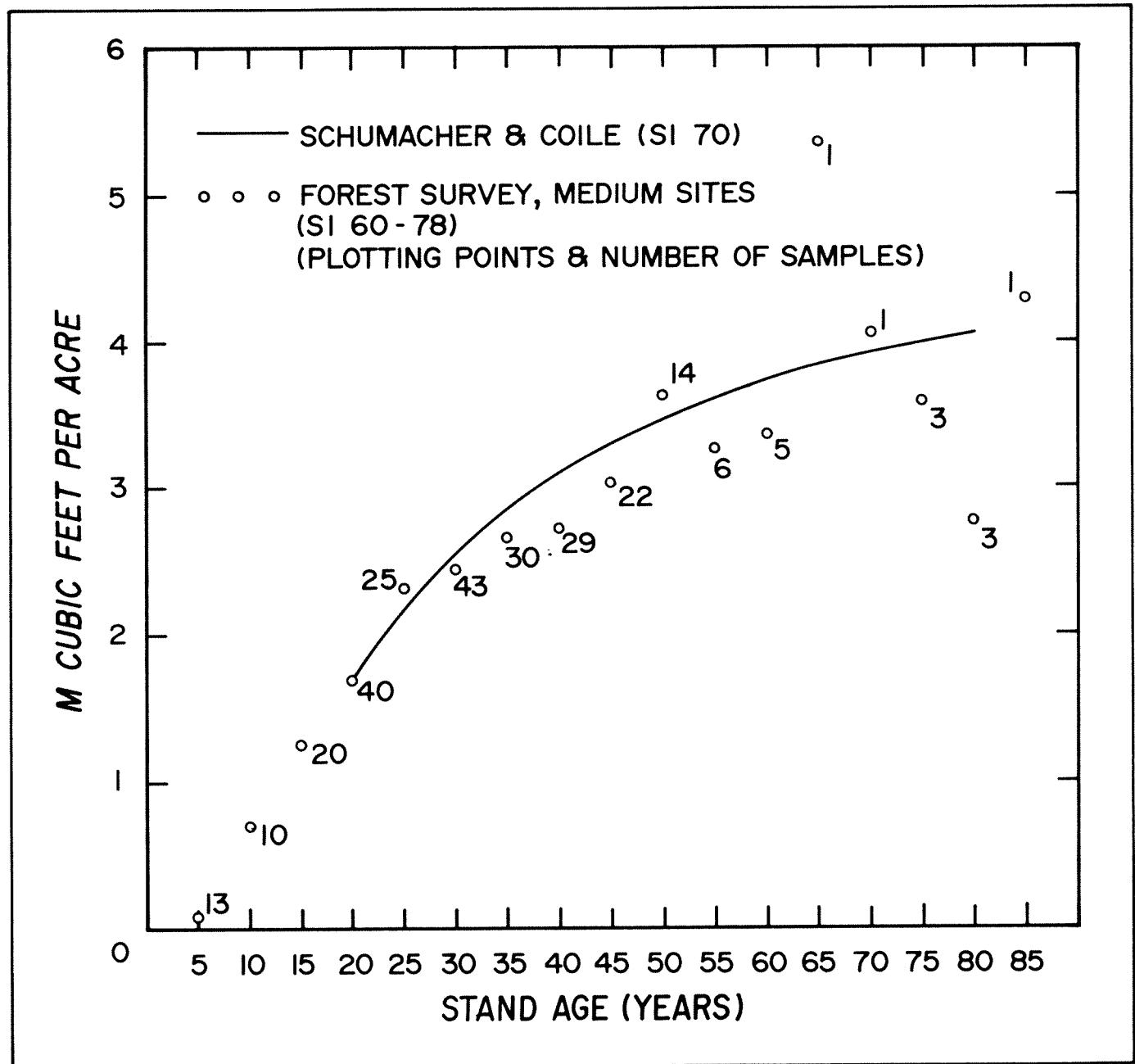


Figure 1.--Yields for fully stocked natural loblolly stands on medium sites in the Coastal Plain of the Southeast.

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## *Yield Tables for Fully Stocked Stands*

Tables 1a, 2a, 3a, ..... 34a show the average empirical yields of timber expressed in numbers of trees, basal area, and volumes per acre for fully stocked stands for specific timber types, sites, and regions, by 5-year age classes.

Table 1b, 2b, 3b, ..... 34b are companion tables which show the average empirical yields of forest biomass expressed in green tons per acre, by tree size and species group.

Table 1a.--Average empirical yields of timber for fully stocked stands

Type: Natural loblolly pine Site: Medium (SI 60-78) Region: Southeast

Table 1b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural loblolly pine      Site: Medium (SI 60-78)      Region: Southeast

Stand age (years)	Total : 1.0+ error	Standard : 5.0+ ; 9.0+	D.b.h. class (inches) : 13.0+ ; 17.0+ ; 21.0+ ; 25.0+ ; 30.0+ ; 35.0+ ; 40.0+ ; 45.0+ ; 50.0+ ; 55.0+ ; 60.0+ ; 65.0+ ; 70.0+ ; 75.0+ ; 80.0+	Species group								
				Yellow pines : softwood			Other pines : softwood			Gums : hardwood		
				;	;	;	;	;	;	;	;	;
10	26.4	3.7	10.1	--	--	--	23.3	--	1.1	1.0	0.9	0.2
15	54.4	4.2	35.6	7.6	--	--	48.3	--	2.7	1.2	1.9	.3
20	72.3	2.9	51.8	15.8	3.3	--	61.9	0.1	3.8	1.9	3.5	1.1
25	91.5	2.9	75.4	30.5	9.8	3.4	81.6	.3	4.4	1.8	2.8	.7
30	101.1	2.6	89.1	48.2	13.9	3.1	88.8	.4	4.8	3.0	2.6	1.5
35	109.0	4.3	95.8	56.1	17.3	2.2	93.3	.1	5.4	3.6	4.0	2.5
40	115.5	3.9	104.7	73.7	25.8	5.5	99.0	.5	5.7	2.7	5.1	2.5
45	118.5	4.0	107.3	79.4	34.1	7.1	104.1	.6	5.4	2.9	4.0	1.5
50	149.1	6.5	136.4	117.7	62.8	18.6	126.7	--	9.2	7.1	3.5	2.7
55	130.9	6.9	121.0	101.3	54.5	15.2	117.2	.4	5.2	3.4	3.7	.9
60	129.0	11.0	116.2	94.9	54.2	18.5	107.4	.5	2.2	4.3	7.9	6.6
65	--	--	--	--	--	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--	--	--	--

Table 2a.—Average empirical yields of timber for fully stocked stands

Type: Natural loblolly pine Site: High (SI 79+) Region: Southeast

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre,			Volume per acre												
					Total			Sawtimber												
		trees 5.0+			aboveground			Growing												
trees 1.0+ : 5.0+ : 9.0+ : 13.0+ : 17.0+ :																				
: : : : : : : : : : :																				

Table 2b.—Average empirical yields of forest biomass for fully stocked stands

Type: Natural loblolly pine      Site: High (SI 79+)      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group							
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood
10	35.3	9.2	23.6	3.1	--	31.8	--	1.8	0.1	1.2	0.4
15	68.3	14.0	48.6	15.5	4.7	--	64.6	--	2.7	0.2	.1
20	102.0	7.1	92.4	51.2	17.8	6.1	94.9	0.1	4.6	.5	.3
25	110.1	3.3	100.5	62.7	23.1	6.2	97.1	.2	3.9	3.9	.7
30	134.6	3.4	124.2	85.8	34.7	9.2	117.0	.3	7.5	4.1	4.6
35	145.8	4.1	135.8	108.3	48.5	11.6	128.6	.2	6.8	4.3	4.8
40	158.8	4.8	148.0	122.5	67.4	17.9	133.9	.2	8.8	5.9	7.3
45	168.7	6.4	160.0	137.9	87.6	28.1	143.3	.7	9.6	7.1	6.3
50	177.3	7.8	170.0	153.7	105.3	33.1	150.4	.1	10.9	5.5	7.4
55	161.3	10.0	153.5	134.1	81.5	24.8	130.1	.2	10.0	6.3	6.8
60	153.7	12.8	140.2	127.0	93.7	35.5	128.4	--	5.2	7.2	10.6
65	206.0	17.9	199.0	188.2	150.1	67.4	172.9	.7	12.8	4.3	10.3
70	158.7	22.0	150.1	138.0	104.5	34.7	132.7	1.0	11.6	6.0	3.8
75	189.5	7.5	179.2	173.7	126.7	44.0	167.5	--	5.3	1.1	.7
80	--	--	--	--	--	--	--	--	--	--	14.9

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Table 3a.—Average empirical yields of timber for fully stocked stands

Type: Natural loblolly pine Site: Medium (SI 60-78) Region: Coastal Plain

Table 3b.—Average empirical yields of forest biomass for fully stocked stands

Type: Natural loblolly pine      Site: Medium (SI 60-78)      Region: Coastal Plain

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group						
				9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood
10	27.1	5.3	7.5	--	--	--	24.7	--	1.5	--
15	53.9	4.8	32.7	5.6	--	--	45.0	--	3.4	1.6
20	74.3	3.0	51.9	16.7	4.2	--	61.6	--	3.8	2.6
25	97.3	4.8	81.1	37.1	15.0	4.4	84.5	0.2	4.8	2.4
30	103.5	3.0	90.3	51.5	16.5	3.6	90.1	.4	5.2	3.2
35	117.4	5.7	101.8	59.5	20.0	2.6	97.6	.2	6.5	4.1
40	116.7	5.2	105.7	72.7	23.1	4.6	99.7	--	5.2	2.9
45	124.2	3.7	112.9	89.2	43.3	9.9	110.6	.2	4.4	3.0
50	155.8	6.5	143.0	124.5	69.5	20.7	133.1	--	8.9	7.2
55	135.0	9.9	122.1	109.4	53.0	15.2	119.9	.8	4.6	3.6
60	147.2	17.2	133.2	111.8	72.9	27.4	123.2	.9	1.9	6.3
65	--	--	--	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--	--

Table 4a.—Average empirical yields of timber for fully stocked stands

Type: Natural loblolly pine Site: Medium (SI 60-78)

## Region: Piedmont

Table 4b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural loblolly pine      Site: Medium (SI 60-78)      Region: Piedmont

Stand age (years)	Total	Standard error	D.b.h. class (inches)			Species group					
			5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks Hard hardwood
			;	;	;	;	;	;	;	;	;
10	25.9	5.3	12.2	--	--	--	22.1	--	0.8	1.8	0.9
15	53.3	7.6	37.4	8.8	--	--	50.8	0.1	2.0	0.4	--
20	69.5	6.0	51.3	15.3	2.3	--	62.3	.2	4.2	.9	1.5
25	86.3	3.6	69.8	23.6	4.7	2.5	78.5	.3	4.0	1.3	.5
30	97.7	4.5	87.7	44.2	10.9	2.6	86.4	.4	4.4	2.8	.4
35	101.1	6.1	90.2	52.9	14.7	2.0	89.2	--	4.3	3.2	1.8
40	114.2	6.0	103.6	74.8	28.8	6.5	98.2	1.0	6.2	2.5	2.5
45	111.9	7.3	100.7	69.9	25.8	4.4	96.9	1.0	6.1	2.7	1.5
50	117.7	6.4	106.1	85.8	31.7	9.0	97.0	--	10.4	6.3	2.1
55	126.7	10.1	119.9	93.1	55.9	15.3	114.5	.1	5.9	3.2	.4
60	--	--	--	--	--	--	--	--	--	--	--
65	--	--	--	--	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--	--	--

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Table 5a.--Average empirical yields of timber for fully stocked stands

Table 5b.--Average empirical yields of forest biomass for fully stocked stands

Type: Planted loblolly pine      Site: Medium (SI 60-78)      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group									
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hard hardwood
10	22.9	1.8	8.0	--	--	--	--	20.6	--	0.8	0.5	0.6	0.3
15	58.6	4.2	43.1	6.9	--	--	--	54.4	0.2	1.0	1.0	1.5	.5
20	83.9	5.7	71.5	16.1	1.0	--	--	79.9	.1	1.2	.9	1.4	.5
25	99.5	5.6	89.4	29.9	1.1	0.4	--	93.1	.2	1.8	1.1	2.7	.6
30	117.6	10.3	115.1	64.4	2.3	--	--	117.2	--	.4	--	--	--
35	129.9	17.3	124.4	70.6	35.5	--	--	127.9	--	.8	.4	--	.8
40	--	--	--	--	--	--	--	--	--	--	--	--	--
45	--	--	--	--	--	--	--	--	--	--	--	--	--
50	--	--	--	--	--	--	--	--	--	--	--	--	--
55	--	--	--	--	--	--	--	--	--	--	--	--	--
60	--	--	--	--	--	--	--	--	--	--	--	--	--
65	--	--	--	--	--	--	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 6a.—Average empirical yields of timber for fully stocked stands

Type: Planted loblolly pine		Site: High (SI 79+)		Region: Southeast	
Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)	Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+ inches	Volume per acre
10	39	928	168	36	989
15	28	888	340	101	2,360
20	28	834	355	119	2,933
25	26	560	333	133	3,388
30	11	481	284	125	3,382
35	1	834	235	143	4,818
40	2	338	188	126	3,607
45	--	--	--	--	2,858
50	--	--	--	--	--
55	--	--	--	--	--
60	--	--	--	--	--
65	--	--	--	--	--
70	--	--	--	--	--
75	--	--	--	--	--
80	--	--	--	--	--

Type: Planted loblolly pine		Site: High (SI 79+)		Region: Southeast	
Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)	Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+ inches	Volume per acre
10	39	928	168	36	989
15	28	888	340	101	2,360
20	28	834	355	119	2,933
25	26	560	333	133	3,388
30	11	481	284	125	3,382
35	1	834	235	143	4,818
40	2	338	188	126	3,607
45	--	--	--	--	2,858
50	--	--	--	--	--
55	--	--	--	--	--
60	--	--	--	--	--
65	--	--	--	--	--
70	--	--	--	--	--
75	--	--	--	--	--
80	--	--	--	--	--

Type: Planted loblolly pine		Site: High (SI 79+)		Region: Southeast	
Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)	Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+ inches	Volume per acre
10	39	928	168	36	989
15	28	888	340	101	2,360
20	28	834	355	119	2,933
25	26	560	333	133	3,388
30	11	481	284	125	3,382
35	1	834	235	143	4,818
40	2	338	188	126	3,607
45	--	--	--	--	2,858
50	--	--	--	--	--
55	--	--	--	--	--
60	--	--	--	--	--
65	--	--	--	--	--
70	--	--	--	--	--
75	--	--	--	--	--
80	--	--	--	--	--

Table 6b.--Average empirical yields of forest biomass for fully stocked stands

Type: Planted loblolly pine      Site: High (SI 79+)

Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group									
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hard hardwood
10	35.6	5.2	22.9	1.0	--	--	--	34.0	--	0.7	0.4	0.3	0.2
15	87.1	5.9	75.9	24.0	0.5	--	--	83.5	0.2	.9	1.7	.5	.3
20	108.5	5.9	98.7	39.1	2.2	--	--	103.4	--	1.6	1.3	2.0	.2
25	125.3	6.2	121.3	73.5	10.6	1.2	--	123.6	--	1.2	.3	.2	.1
30	124.8	8.5	120.3	81.9	20.1	1.2	--	120.2	--	3.2	1.1	--	.3
35	177.0	--	171.4	151.9	58.7	5.1	--	156.0	--	6.8	5.1	--	9.1
40	132.8	9.5	131.0	118.8	59.1	9.2	--	111.1	--	5.6	4.2	10.3	1.5
45	--	--	--	--	--	--	--	--	--	--	--	--	--
50	--	--	--	--	--	--	--	--	--	--	--	--	--
55	--	--	--	--	--	--	--	--	--	--	--	--	--
60	--	--	--	--	--	--	--	--	--	--	--	--	--
65	--	--	--	--	--	--	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 7a.—Average empirical yields of timber for fully stocked stands

Table 7b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural slash pine      Site: Medium (62-80)      Region: Southeast

Stand age (years)	Total	Standard	D.b.h. class (inches)	Species group								
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks
-- -- -- -- -- -- -- -- -- --												
10	9.5	1.6	3.8	--	--	--	--	9.1	--	--	0.5	--
15	51.7	24.1	32.1	3.3	--	--	--	48.0	3.4	--	.3	--
20	80.8	8.9	55.7	12.2	0.9	--	--	79.5	--	0.8	.2	0.1
25	103.6	5.1	83.4	31.3	6.5	1.9	96.2	3.3	1.3	1.1	1.4	
30	101.1	5.9	83.5	36.8	10.2	3.8	91.2	1.4	3.0	4.0	.6	
35	120.1	6.9	98.7	42.4	9.7	1.6	110.7	.7	2.0	5.9	.3	
40	124.8	9.3	107.4	60.2	20.3	5.6	108.7	8.4	4.0	1.5	2.2	
45	122.2	6.6	111.2	73.3	20.2	1.5	117.6	--	.9	--	3.3	
50	147.4	13.0	130.6	79.2	15.4	3.1	119.5	16.3	9.7	1.9	--	
55	141.4	7.7	127.7	93.9	39.0	10.9	119.4	7.0	10.0	3.2	.9	
60	--	--	--	--	--	--	--	--	--	--	--	
65	--	--	--	--	--	--	--	--	--	--	--	
70	--	--	--	--	--	--	--	--	--	--	--	
75	--	--	--	--	--	--	--	--	--	--	--	
80	--	--	--	--	--	--	--	--	--	--	--	

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Table 8a.—Average empirical yields of timber for fully stocked stands

**Type:** Natural slash pine      **Site:** High (SI 81+)      **Region:** Southeast

Table 8b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural slash pine      Site: High (SI 81+)      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group							
				9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks
Green tons per acre											
10	--	--	--	--	--	--	--	--	--	--	
15	--	--	--	--	--	--	--	--	--	--	
20	96.7	12.1	79.6	24.3	9.7	0.6	89.7	0.1	2.1	0.7	
25	123.2	6.9	106.1	55.2	8.3	2.1	117.6	.5	2.3	1.0	
30	132.7	5.0	122.2	86.0	22.7	4.6	128.7	.2	1.2	1.0	
35	139.4	6.3	129.4	94.2	33.3	4.7	130.8	1.6	3.0	2.2	
40	144.3	5.8	135.3	99.8	36.1	4.2	136.9	--	4.5	2.4	
45	149.9	7.4	140.7	119.5	61.3	14.8	136.6	2.8	5.5	3.1	
50	187.3	88.5	180.3	158.7	113.5	68.4	157.9	--	10.5	5.0	
55	186.9	25.5	174.8	160.3	78.9	5.7	169.0	--	6.0	7.9	
60	188.4	18.4	179.4	153.8	106.2	39.4	151.9	4.5	21.6	3.1	
65	--	--	--	--	--	--	--	--	--	--	
70	--	--	--	--	--	--	--	--	--	--	
75	--	--	--	--	--	--	--	--	--	--	
80	--	--	--	--	--	--	--	--	--	--	



Table 9b.--Average empirical yields of forest biomass for fully stocked stands

Type: Planted slash pine      Site: Medium (SI 62-80)      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)			Species group						
			5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hardwood
			Green tons per acre									
10	21.4	1.8	5.5	--	--	--	20.8	--	--	--	0.5	--
15	49.7	1.7	31.8	0.7	--	--	48.6	--	0.1	0.2	.6	0.2
20	71.5	2.3	57.4	5.6	0.6	--	69.4	0.1	.1	.3	1.5	.2
25	85.5	3.4	73.1	13.7	1.3	--	83.9	--	.3	.1	1.0	.1
30	91.4	10.1	81.9	35.4	1.3	0.2	87.1	2.2	.3	.6	.6	.6
35	87.0	16.6	76.4	30.3	8.8	2.0	83.7	--	--	3.3	--	--
40	104.7	13.4	96.8	69.7	33.5	4.8	94.2	--	2.1	--	8.5	--
45	--	--	--	--	--	--	--	--	--	--	--	--
50	--	--	--	--	--	--	--	--	--	--	--	--
55	--	--	--	--	--	--	--	--	--	--	--	--
60	--	--	--	--	--	--	--	--	--	--	--	--
65	--	--	--	--	--	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--	--	--	--

Table 10a.—Average empirical yields of timber for fully stocked stands

Type:	Planted slash pine	Site: High (SI 81+)			Region: Southeast		
Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)	Basal area per acre,	Total aboveground trees 5.0+ inches : 17.0+	Standard error :	Growing stock :	Volume per acre
10	13	693	173	1	--	37	1,002
15	29	771	330	11	1	76	1,875
20	76	743	375	39	2	104	2,636
25	61	496	331	70	2	111	2,874
30	7	496	248	115	16	109	3,057
35	3	626	185	123	22	110	3,513
40	4	364	169	140	49	131	4,500
45	--	--	--	--	--	--	650
50	--	--	--	--	--	--	3,933
55	--	--	--	--	--	--	3,427
60	--	--	--	--	--	--	18,105
65	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--

Board feet							
Square feet							
10	13	693	173	1	--	37	1,002
15	29	771	330	11	1	76	1,875
20	76	743	375	39	2	104	2,636
25	61	496	331	70	2	111	2,874
30	7	496	248	115	16	109	3,057
35	3	626	185	123	22	110	3,513
40	4	364	169	140	49	131	4,500
45	--	--	--	--	--	--	650
50	--	--	--	--	--	--	3,933
55	--	--	--	--	--	--	3,427
60	--	--	--	--	--	--	18,105
65	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--

Saw-timber portion : International 4-inch rule							
10	13	693	173	1	--	37	1,002
15	29	771	330	11	1	76	1,875
20	76	743	375	39	2	104	2,636
25	61	496	331	70	2	111	2,874
30	7	496	248	115	16	109	3,057
35	3	626	185	123	22	110	3,513
40	4	364	169	140	49	131	4,500
45	--	--	--	--	--	--	650
50	--	--	--	--	--	--	3,933
55	--	--	--	--	--	--	3,427
60	--	--	--	--	--	--	18,105
65	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--

Table 10b. --Average empirical yields of forest biomass for fully stocked stands

Type: Planted slash pine      Site: High (SI 81+)      Region: Southeast

Stand age (years)	Total	Standard	D.b.h. class (inches)	Species group					
				Yellow pines			Other softwood		
				17.0+	13.0+	9.0+	softwood	Gums	Oaks
Green tons per acre									
10	36.9	7.2	21.3	0.4	--	36.8	--	--	0.1
15	70.2	5.6	56.0	5.4	0.7	--	68.6	--	0.3
20	100.4	3.4	89.3	21.3	2.1	0.2	97.1	--	1.3
25	110.1	4.0	105.8	42.2	2.7	.3	108.2	--	.9
30	116.2	14.8	109.8	81.5	20.2	--	113.8	--	2.4
35	134.4	16.4	129.1	117.6	30.0	3.1	133.1	--	.3
40	173.8	25.3	172.4	161.5	75.6	4.6	172.4	--	.3
45	--	--	--	--	--	--	--	--	1.1
50	--	--	--	--	--	--	--	--	--
55	--	--	--	--	--	--	--	--	--
60	--	--	--	--	--	--	--	--	--
65	--	--	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--

Table 1a.—Average empirical yields of timber for fully stocked stands

**Type:** Natural shortleaf pine      **Site:** Medium (SI 54-71)      **Region:** Southeast

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre,			Volume per acre			
		1.0+	5.0+	9.0+	13.0+	17.0+	Total trees 5.0+ inches	aboveground trees 1.0+	Standard error	Growing stock	Saw-log portion
10	4	1,283	14	--	--	--	319	89	18	--	--
15	9	1,458	181	13	--	--	212	216	590	58	309
20	11	1,363	308	26	3	--	79	2,025	190	1,138	180
25	18	1,149	313	35	3	--	88	2,168	134	1,351	286
30	18	1,282	293	44	5	--	91	2,490	192	1,540	431
35	21	1,099	318	67	6	--	104	2,665	124	1,822	657
40	16	880	266	83	12	1	108	2,868	131	2,144	973
45	6	1,275	295	78	4	--	97	2,720	238	1,798	689
50	3	1,235	203	79	13	--	86	2,874	421	1,923	1,144
55	8	716	295	106	18	3	126	3,703	224	2,870	1,620
60	4	795	310	101	15	2	127	3,461	296	2,567	1,264
65	4	799	249	88	12	1	99	2,625	180	1,948	1,052
70	3	1,184	217	75	19	1	96	2,990	109	2,188	1,289
75	1	632	232	165	43	--	139	3,822	--	3,140	2,296
80	2	680	229	142	65	12	158	4,957	473	4,019	3,355

Table 11b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural shortleaf pine      Site: Medium (SI 54-71)      Region: Southeast

Stand age (years)	Total	Standard	D.b.h. class (inches)	Species group								
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft	Oaks
Green tons per acre												
10	12.3	3.5	1.2	--	--	--	11.0	0.4	--	--	0.2	0.7
15	43.0	7.6	26.7	5.1	--	--	39.1	.5	3.1	--	.1	.3
20	71.2	6.8	51.3	11.7	3.0	--	61.9	1.8	2.6	2.4	1.4	1.1
25	76.6	4.7	61.1	17.0	2.7	0.3	66.6	1.2	2.8	2.6	1.2	2.1
30	89.4	7.0	69.3	25.8	4.9	.4	72.1	1.4	5.7	2.1	4.9	3.3
35	95.1	4.6	80.6	37.7	6.3	.6	81.2	1.3	4.7	2.6	1.7	3.6
40	103.3	4.8	92.6	53.7	15.2	3.3	88.0	1.2	1.7	3.7	5.1	3.6
45	98.1	8.6	79.7	44.1	4.3	.5	73.3	.1	5.4	8.1	2.8	8.4
50	104.1	16.2	80.8	57.8	16.7	--	86.5	1.7	3.7	1.4	7.0	3.8
55	135.0	8.5	126.2	89.0	28.0	8.1	106.0	--	4.0	6.2	13.8	5.0
60	127.7	9.7	117.1	71.2	17.6	3.8	110.8	--	5.1	1.8	7.6	2.4
65	93.8	6.3	85.4	56.3	13.0	1.1	84.5	.6	2.0	1.5	1.8	3.3
70	108.3	5.0	92.3	61.5	23.1	2.8	97.9	1.5	3.9	0.4	2.7	1.9
75	138.0	--	133.5	124.0	46.0	--	110.1	3.2	20.4	--	4.2	--
80	178.2	15.9	173.3	155.6	97.9	27.0	147.8	.9	14.2	11.9	--	3.4

Table 12a.--Average empirical yields of timber for fully stocked stands

**Type:** Natural longleaf pine    **Site:** All sites**Region:** Southeast

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)		Basal area per acre,		Volume per acre		Sawtimber portion : $\frac{1}{4}$ -inch rule				
		trees 5.0+		trees 5.0+		trees 1.0+						
		1.0+	5.0+	9.0+	13.0+	17.0+	21.0+					
<u>Square feet</u>												
10	2	152	33	12	--	--	15	410	--	345	155	818
15	2	871	22	22	2	--	13	533	53	226	168	888
20	2	921	121	3	--	--	32	811	610	416	27	140
25	10	866	236	50	4	--	75	2,105	287	1,375	582	3,073
30	17	720	182	53	7	--	67	1,829	182	1,269	641	3,390
35	14	690	236	55	11	1	86	2,494	235	1,785	911	4,811
40	21	539	218	79	15	1	91	2,541	172	1,979	1,211	6,398
45	31	555	198	75	15	1	86	2,449	136	1,894	1,250	6,605
50	23	437	201	97	22	1	99	3,121	191	2,512	1,834	9,692
55	19	460	165	104	27	3	99	3,247	225	2,653	2,147	11,343
60	11	350	161	96	22	2	88	2,588	173	2,155	1,723	9,101
65	4	773	217	126	30	4	121	4,115	994	3,415	2,666	14,095
70	11	366	177	114	32	2	108	3,368	297	2,839	2,406	12,729
75	8	317	112	76	34	2	78	2,615	442	2,201	1,983	10,473
80	3	504	138	78	25	7	83	2,591	527	2,191	1,989	10,506

Table 12b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural longleaf pine      Site: All sites

Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group								
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks
Green tons per acre												
10	16.0	--	15.7	8.2	--	--	16.0	--	--	--	--	--
15	19.5	2.1	9.8	9.8	1.2	--	19.5	--	--	--	--	--
20	29.4	22.1	19.6	1.4	--	--	29.1	--	--	--	0.3	--
25	80.0	11.1	66.0	31.5	3.9	--	68.8	--	3.0	3.9	3.6	0.7
30	69.4	7.0	59.5	34.3	8.6	0.9	65.4	--	0.5	0.7	2.1	.7
35	95.4	9.2	84.1	45.5	16.3	1.9	91.9	--	.4	.3	2.6	.1
40	98.2	6.8	91.3	61.5	19.0	1.9	93.9	--	.7	.2	1.8	1.6
45	94.6	5.4	87.6	63.0	20.2	1.8	89.6	--	.9	.7	3.2	.1
50	121.1	7.5	114.4	90.0	31.1	3.4	117.9	0.3	.3	.3	2.1	.2
55	126.5	8.9	119.2	103.3	41.9	7.8	123.2	--	1.8	--	1.4	--
60	101.9	6.9	97.9	84.1	30.8	5.2	97.5	--	--	.1	3.6	.8
65	159.8	38.0	152.6	130.8	49.6	8.9	151.6.	.3	1.3	4.3	2.2	--
70	132.3	11.7	128.5	115.0	49.6	7.2	127.0	--	.4	--	4.9	--
75	102.3	17.4	98.7	90.2	54.1	6.0	99.7	--	.3	--	2.1	.2
80	101.2	21.1	98.0	89.8	49.4	20.1	100.4	--	.2	--	.3	.3

Table 13a.—Average empirical yields of timber for fully stocked stands

Type: Natural Virginia pine      Site: Medium (SI 57-66)      Region: Southeast

Stand age (years)	Sample plots	Live trees per acre,			Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+ inches	Standard error	Growing stock	Saw-log portion	Sawtimber International $\frac{1}{4}$ -inch rule portion	Volume per acre	
		1.0+	5.0+	9.0+								
10	14	1,154	61	--	--	12	751	107	135	--	--	
15	14	1,985	149	6	--	--	1,770	168	457	18	95	
20	27	1,821	210	11	1	--	2,127	133	730	68	367	
25	30	1,203	297	34	3	--	2,562	127	1,398	283	1,505	
30	21	1,024	344	53	5	--	106	3,002	118	1,927	490	2,593
35	22	1,068	310	56	5	--	95	2,850	160	1,789	505	2,678
40	14	923	309	68	6	--	106	2,914	197	2,064	676	3,592
45	8	744	357	119	7	--	135	3,882	179	2,917	1,274	6,762
50	4	1,243	269	137	13	1	118	3,596	121	2,511	1,481	7,851
55	3	1,115	281	75	11	2	101	2,994	229	2,069	798	4,285
60	2	879	259	52	3	--	79	2,602	242	1,526	508	2,738
65	3	871	304	109	19	1	129	3,739	606	2,793	1,286	6,965
70	1	709	308	100	29	--	143	3,953	--	3,002	1,812	9,609
75	--	--	--	--	--	--	--	--	--	--	--	--
80	1	717	217	107	33	2	116	3,343	--	2,717	1,623	8,574

Table 13b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural Virginia pine      Site: Medium (SI 57-66)      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group						
				13.0+	13.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks Hardwood
Green tons per acre										
10	28.4	4.0	8.9	--	--	25.9	0.5	0.2	0.7	0.6
15	66.4	6.2	25.7	3.0	--	59.7	.3	1.5	2.4	1.4
20	80.2	4.9	39.9	5.7	0.8	70.0	1.2	1.0	3.5	3.1
25	97.3	4.7	70.6	18.8	3.5	84.9	1.4	2.6	2.4	2.4
30	113.3	4.5	92.9	30.1	4.8	99.4	1.8	.9	3.2	3.6
35	107.6	5.9	85.2	32.1	5.3	93.3	.2	2.8	2.7	5.9
40	109.2	7.4	96.5	43.3	5.5	92.5	1.4	5.0	5.7	2.5
45	144.5	6.0	133.7	79.5	9.7	127.0	.1	3.5	4.4	6.0
50	132.8	4.1	113.3	88.9	16.8	2.1	112.2	.8	2.5	6.6
55	115.2	10.7	99.2	54.7	16.2	5.1	83.5	1.1	2.0	2.2
60	96.7	10.7	70.5	31.6	4.4	0	84.7	--	.3	1.9
65	144.4	23.9	132.7	85.5	24.6	1.3	93.5	--	4.0	5.8
70	146.9	--	136.7	92.3	36.1	--	130.8	2.3	--	4.4
75	--	--	--	--	--	--	--	--	--	--
80	122.0	--	115.2	86.0	37.8	3.6	115.2	.5	--	6.3

Table 14a.—Average empirical yields of timber for fully stocked stands

Type: Natural Virginia Pine      Site: High (SI 67+)      Region: Southeast

Stand age (years)	Sample Plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre, trees 5.0+ inches	Total aboveground growing stock : trees 1.0+	Volume per acre		
							Sawtimber		
							Standard error		
3	1,438	138	--	--	38	1,369	388		
10	3	1,438	138	--	59	2,410	656		
15	2	1,128	228	12	56	2,098	1,066		
20	7	1,169	212	14	1	191	923		
25	11	780	313	54	2	2,614	1,721		
30	14	902	329	70	4	107	3,040		
35	11	969	307	90	7	118	3,615		
40	13	1,000	320	97	13	124	3,746		
45	3	547	246	132	20	124	3,614		
50	6	729	316	103	18	3	519		
55	--	--	--	--	--	129	2,871		
60	--	--	--	--	--	4,107	1,707		
65	1	767	267	125	5	2	2,743		
70	--	--	--	--	--	--	1,364		
75	--	--	--	--	--	--	7,266		
80	--	--	--	--	--	--	--		

Table 14b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural Virginia pine      Site: High (SI 67+)      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group							
				Yellow pines			Other softwood		Gums		Soft hardwood
				5.0+	9.0+	13.0+	17.0+	pines	softwood	Gums	hardwood
Green tons per acre											
10	51.8	28.5	26.9	--	--	--	48.6	--	--	--	0.2
15	90.2	27.0	51.9	4.5	--	--	89.9	--	0.1	--	0.2
20	79.7	7.6	47.9	9.6	3.8	1.4	69.8	1.7	--	1.2	3.9
25	98.4	5.6	84.6	28.7	3.0	--	91.4	1.5	.4	2.5	2.2
30	114.4	4.5	96.6	38.8	4.1	0.5	109.1	--	1.2	3.1	.3
35	135.7	7.0	119.8	62.5	9.9	5.0	119.4	1.3	1.2	5.1	6.7
40	140.1	9.2	125.3	70.6	16.1	.7	126.8	1.3	1.5	3.1	4.6
45	132.2	18.5	124.7	94.6	22.2	--	126.9	--	2.0	.7	2.6
50	154.3	11.4	147.0	88.9	27.3	8.0	133.3	0.8	--	5.8	6.0
55	--	--	--	--	--	--	--	--	--	--	--
60	--	--	--	--	--	--	--	--	--	--	--
65	146.9	--	135.4	95.0	9.5	4.9	115.8	--	20.1	--	11.0
70	--	--	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--	--	--

Table 15a.--Average empirical yields of timber for fully stocked stands

Type: Natural pond pine			Site: All sites			Region: Southeast		
Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)	Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+ inches	Growing stock	Volume per acre	Sawtimber portion	Saw-log portion : International $\frac{1}{4}$ -inch rule
10	4	558	8	—	—	81	53	19
15	13	824	52	6	—	440	101	133
20	13	1,169	117	12	1	802	137	368
25	22	1,194	201	29	2	59	1,494	135
30	30	1,053	200	34	5	63	1,563	169
35	20	1,108	267	58	8	91	2,293	197
40	25	911	232	57	10	85	2,039	177
45	26	1,054	222	70	17	91	2,394	181
50	17	925	270	65	14	96	2,529	274
55	6	1,058	195	83	18	90	2,578	251
60	14	1,406	223	97	22	4	105	3,144
65	3	1,938	136	64	16	1	73	2,397
70	3	1,016	150	74	24	5	86	2,384
75	4	1,702	153	80	17	2	85	2,558
80	—	—	—	—	—	—	—	—

Site: All sites			Region: Southeast		
Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)	Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+ inches	Growing stock
10	4	558	8	—	—
15	13	824	52	6	—
20	13	1,169	117	12	1
25	22	1,194	201	29	2
30	30	1,053	200	34	5
35	20	1,108	267	58	8
40	25	911	232	57	10
45	26	1,054	222	70	17
50	17	925	270	65	14
55	6	1,058	195	83	18
60	14	1,406	223	97	22
65	3	1,938	136	64	16
70	3	1,016	150	74	24
75	4	1,702	153	80	17
80	—	—	—	—	—

Table 15b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural Pond pine

Site: All sites

Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group								
				1.0+	5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood
10	3.0	1.9	0.9	--	--	--	--	--	3.0	--	--	--
15	17.5	4.0	7.2	2.4	--	--	--	16.0	0.1	0.3	1.0	--
20	30.9	4.9	19.3	5.8	0.7	--	--	26.9	--	.4	1.1	1.6
25	56.9	4.7	41.2	14.7	2.1	0.3	50.9	.9	1.6	2.9	0.2	.4
30	60.4	5.9	46.6	20.1	6.4	2.5	53.1	1.0	2.9	1.9	1.2	.2
35	84.5	6.4	73.7	37.4	9.4	.4	72.8	1.9	3.5	4.1	.3	1.8
40	77.5	5.7	67.5	38.8	13.9	4.2	68.2	.9	4.7	3.1	.3	.2
45	88.6	6.1	78.3	52.9	22.5	5.3	77.7	--	--	2.8	6.0	1.4
50	94.3	9.1	82.9	50.3	20.3	2.6	79.0	--	--	2.4	11.4	.8
55	93.1	9.3	82.8	65.7	27.1	7.6	79.7	.1	7.9	4.8	--	.5
60	113.7	3.5	97.2	75.2	33.8	9.8	91.9	--	4.6	14.8	.3	2.1
65	87.7	1.3	64.9	52.1	21.2	2.8	68.8	--	11.9	3.3	.6	3.1
70	89.2	9.5	79.1	64.8	33.5	10.4	74.5	2.5	8.3	1.3	1.0	1.5
75	94.8	11.8	77.6	64.1	21.4	3.2	75.9	1.9	10.2	4.4	--	2.3
80	--	--	--	--	--	--	--	--	--	--	--	--

Table 16a.—Average empirical yields of timber for fully stocked stands

Type: Natural oak-pine		Site: Medium		Region: Southeast	
Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)	Basal area per acre, trees 5.0+ inches	Total aboveground growing stock	Volume per acre Sawtimber
10	21	967 42	10 464	75 122	--
15	16	1,502 110	30 1,100	139 443	71
20	30	1,512 205	61 1,963	111 989	261
25	31	1,320 222	74 2,145	145 1,214	437
30	36	1,255 253	86 2,425	106 1,470	541
35	40	1,122 243	96 2,809	138 1,802	856
40	44	1,102 240	90 2,615	83 1,695	717
45	38	1,011 245	104 3,028	90 2,036	949
50	44	984 249	5 115	3,430 126	5,211
55	23	925 229	5 107	3,199 179	1,294
60	23	1,043 239	5 115	3,541 211	7,019
65	14	1,061 213	7 108	3,185 186	6,574
70	18	1,061 247	10 120	3,489 188	7,218
75	8	831 183	8 105	3,265 203	1,204
80	9	940 205	8 112	3,417 161	1,411
					7,656
					1,339
					7,254
					1,627
					8,935
					1,669
					9,103
					1,513
					8,341

Table 16b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural oak-pine      Site: Medium      Region: Southeast

Stand age (years)	Total	Standard	D.b.h. class (inches)	Species group								
				1.0+	error	5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums
-- -- -- -- -- -- -- -- -- -- -- -- --												
10	17.6	2.8	6.1	--	--	--	--	--	6.3	0.6	5.4	1.6
15	42.0	5.3	22.5	7.0	--	--	--	--	15.8	1.0	10.1	2.1
20	73.7	4.1	49.7	19.2	5.3	--	--	--	29.8	3.7	9.0	5.3
25	80.1	5.2	61.0	28.9	11.0	2.7	32.8	3.0	14.8	8.7	12.9	7.0
30	90.8	3.8	73.0	38.4	14.4	4.4	36.5	2.4	15.0	11.1	13.9	4.3
35	104.7	4.8	88.6	55.5	25.9	9.3	38.0	9.0	18.1	10.2	11.1	19.3
40	99.3	3.0	82.7	48.4	16.8	4.0	38.6	3.1	12.5	9.0	10.2	6.4
45	113.8	3.2	99.0	65.5	29.3	11.8	41.1	5.3	12.2	15.3	11.1	14.9
50	127.9	4.5	112.3	81.9	38.5	13.7	46.9	8.7	23.5	15.0	15.0	24.6
55	120.7	6.4	107.9	79.0	39.3	15.7	41.2	11.3	11.0	16.2	16.2	23.2
60	131.3	7.2	113.5	86.1	46.1	12.5	45.7	10.2	23.2	13.7	13.7	28.7
65	119.9	6.9	102.7	77.9	45.8	16.8	42.3	13.1	12.4	16.0	16.0	31.6
70	131.8	6.5	122.6	95.1	59.0	30.0	49.5	3.0	13.4	17.9	17.9	19.3
75	123.4	6.4	114.3	96.4	59.2	21.5	50.3	--	14.7	13.7	13.7	11.0
80	127.3	7.7	114.2	92.8	56.1	22.1	46.0	4.0	16.5	25.8	25.8	11.9
												5.1

Table 17a.—Average empirical yields of timber for fully stocked stands

Type: Natural oak-pine      Site: High      Region: Southeast

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+	Standard error	Growing stock	Saw-log portion	Sawtimber portion	Volume per acre
		1.0+	5.0+	9.0+							
		13.0+	17.0+								
Square feet											
10	4	1,099	75	28	--	--	29	964	170	574	204
15	5	1,112	87	18	5	--	29	936	79	507	233
20	7	1,214	248	55	16	3	93	2,577	303	1,560	629
25	2	1,449	197	22	10	2	62	1,742	238	1,112	433
30	30	991	258	78	25	7	111	3,278	130	2,299	1,286
35	25	866	251	80	23	6	111	3,205	145	2,200	1,216
40	31	871	228	86	33	10	117	3,596	151	2,567	1,641
45	28	759	229	87	37	12	120	3,636	128	2,672	1,814
50	17	792	234	100	38	12	129	4,056	183	3,006	2,001
55	20	712	217	87	38	11	118	3,788	173	2,818	1,875
60	15	898	217	88	41	13	122	3,920	196	2,807	2,094
65	6	771	175	99	51	21	138	4,751	297	3,514	2,933
70	11	682	176	92	53	25	139	4,850	238	3,726	3,229
75	2	579	180	94	62	19	134	4,092	624	3,007	2,743
80	4	1,035	244	99	46	17	142	4,976	843	3,650	2,831
											15,479

Board  
feet

Table 17b.—Average empirical yields of forest biomass for fully stocked stands

Type: Natural oak-pine      Site: High      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)			Species group						
			5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hard hardwood
Green tons per acre												
10	35.8	6.5	26.1	18.7	--	--	15.0	--	5.2	8.6	6.9	0.2
15	35.3	2.5	24.8	15.4	6.5	--	11.1	4.3	5.3	5.5	6.1	3.1
20	94.2	11.6	80.4	45.5	23.5	9.2	34.7	4.8	18.5	20.9	14.1	1.1
25	66.2	9.0	52.8	20.6	13.7	4.2	37.6	--	10.2	7.4	8.3	2.8
30	122.4	4.6	107.6	72.8	39.7	16.1	51.9	0.7	28.7	14.8	22.0	4.3
35	119.7	5.3	106.7	74.9	37.3	15.6	46.7	.7	25.1	15.2	23.1	8.9
40	134.4	5.7	121.9	94.6	59.7	27.8	51.2	4.1	20.1	19.9	32.7	6.3
45	136.4	4.8	126.6	101.5	68.8	33.3	50.1	4.0	29.2	13.4	32.4	7.3
50	150.1	6.9	139.1	113.9	74.6	37.0	52.8	1.4	37.5	22.1	27.8	8.5
55	143.1	6.6	132.0	106.6	70.9	30.3	47.0	2.7	23.5	20.5	37.2	12.3
60	147.2	7.8	136.6	114.9	84.2	43.3	58.3	.3	31.0	18.6	27.4	11.6
65	182.6	9.7	172.7	158.4	126.5	76.5	54.6	4.8	39.1	14.9	63.1	6.1
70	182.4	8.8	172.4	155.5	128.9	86.8	65.9	9.0	45.7	26.8	29.5	5.5
75	162.4	25.8	156.3	141.6	121.2	56.3	70.5	26.0	4.6	--	53.7	7.6
80	185.0	31.3	170.6	144.6	108.1	62.0	62.1	17.0	37.3	31.1	26.3	11.1

Table 18a.--Average empirical yields of timber for fully stocked stands

Type: Natural oak-pine			Site: Medium			Region: Coastal Plain		
Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)	Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+ inches	Growing stock	Saw-log portion	Saw-timber portion	International $\frac{1}{4}$ -inch rule
10	10	946	45	--	--	9	482	134
15	5	1,879	118	11	--	31	1,252	213
20	21	1,420	202	33	5	63	1,925	126
25	20	1,364	227	48	10	78	2,342	182
30	14	1,092	322	62	12	3	2,805	106
35	25	1,161	250	74	20	5	3,039	103
40	15	1,204	236	61	16	2	2,768	90
45	15	995	218	75	20	5	101	3,017
50	28	1,035	254	96	25	5	117	3,470
55	13	804	234	95	33	9	118	3,520
60	15	1,119	246	101	35	6	122	3,850
65	7	1,254	195	77	33	5	100	3,083
70	9	907	242	92	35	14	128	3,902
75	5	877	177	90	35	9	109	3,445
80	5	1,005	205	80	33	7	107	3,257

Square foot			Cubic feet			Volume per acre		
10	10	946	45	--	--	9	482	134
15	5	1,879	118	11	--	31	1,252	213
20	21	1,420	202	33	5	63	1,925	126
25	20	1,364	227	48	10	78	2,342	182
30	14	1,092	322	62	12	3	2,805	106
35	25	1,161	250	74	20	5	3,039	103
40	15	1,204	236	61	16	2	2,768	90
45	15	995	218	75	20	5	101	3,017
50	28	1,035	254	96	25	5	117	3,470
55	13	804	234	95	33	9	118	3,520
60	15	1,119	246	101	35	6	122	3,850
65	7	1,254	195	77	33	5	100	3,083
70	9	907	242	92	35	14	128	3,902
75	5	877	177	90	35	9	109	3,445
80	5	1,005	205	80	33	7	107	3,257

Board feet		
10	10	946
15	5	1,879
20	21	1,420
25	20	1,364
30	14	1,092
35	25	1,161
40	15	1,204
45	15	995
50	28	1,035
55	13	804
60	15	1,119
65	7	1,254
70	9	907
75	5	877
80	5	1,005

Table 18b.—Average empirical yields of forest biomass for fully stocked stands

Type: Natural oak-pine      Site: Medium      Region: Coastal Plain

Stand age (years)	Total	Standard error	D.b.h. class (inches)			Species group		
			5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood
			;	;	;	;	;	Oaks Hardwood
10	18.0	5.0	6.1	--	--	--	7.5	0.8
15	48.0	8.6	22.9	5.3	--	--	21.4	--
20	72.0	4.7	50.9	21.8	6.3	--	29.1	4.9
25	86.8	6.3	66.4	34.0	12.3	2.8	37.7	2.7
30	102.9	6.0	87.6	44.8	16.6	5.7	41.4	2.1
35	111.1	6.8	95.0	63.7	30.8	11.8	43.5	12.4
40	102.5	6.3	82.0	49.3	21.1	3.6	42.4	7.7
45	112.2	5.1	95.9	65.8	32.5	14.9	43.7	10.4
50	126.8	6.5	111.0	81.8	38.0	12.9	49.5	10.7
55	131.0	6.9	120.1	93.9	53.5	21.9	49.1	12.4
60	140.4	9.7	120.0	94.1	51.7	14.4	49.0	11.9
65	114.0	12.1	93.1	71.9	45.6	11.8	45.3	19.3
70	146.0	9.2	133.6	109.5	73.7	42.9	60.7	5.5
75	129.1	9.0	120.2	103.4	66.2	26.7	50.2	--
80	121.7	13.4	109.1	85.9	55.5	16.6	44.7	1.6

Green tons per acre

6.5    13.6    10.6    11.1

4.0

7.6

13.4

13.8

15.1

19.4

16.4

10.5

18.2

25.8

17.0

30.0

5.1

22.7

15.4

24.7

15.6

29.8

12.0

33.3

2.7

Table 19a.—Average empirical yields of timber for fully stocked stands

**Type:** Natural oak-pine      **Site:** Medium      **Region:** Piedmont

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)		Basal area per acre,	Total trees 5.0+ inches	aboveground trees 1.0+	Standard error	Growing stock	Saw-log portion	International $\frac{1}{4}$ -inch rule	Sawtimber
		1.0+	5.0+								
10	9	936	47	--	--	--	--	--	--	--	--
15	11	1,330	106	15	--	--	--	11	465	102	138
20	7	1,820	206	27	2	--	30	1,031	180	441	72
25	11	1,241	214	29	7	1	58	2,105	294	912	162
30	19	1,365	197	49	9	1	66	1,786	210	958	216
35	15	1,057	231	55	13	2	72	2,144	121	1,250	460
40	25	1,060	243	63	11	2	85	2,424	129	1,527	528
45	20	983	265	79	17	4	91	2,566	92	1,712	682
50	14	923	231	88	25	6	107	3,053	118	2,099	899
55	5	1,224	184	68	13	2	110	3,397	126	2,315	1,247
60	6	966	219	66	20	4	81	2,481	220	1,495	683
65	3	825	225	86	36	12	94	2,714	140	1,886	967
70	6	613	267	81	30	8	123	3,504	95	2,476	1,664
75	1	367	187	52	34	3	116	3,252	246	2,430	1,285
80	3	946	212	109	34	6	90	2,926	--	2,355	1,804
							118	3,637	202	2,639	9,276

Table 19b.—Average empirical yields of forest biomass for fully stocked stands

Type: Natural oak-pine      Site: Medium

Region: Piedmont

Stand age (years)	D.b.h. class (inches)			Species group					
	Total	Standard		Yellow	Other	Gums	Soft	Oaks	Hard
	1.0+	error	5.0+	9.0+	13.0+	pines	softwood	:	hardwood
<u>Green tons per acre</u>									
10	17.8	3.8	6.8	--	--	6.0	0.4	4.2	2.3
15	39.3	6.8	22.4	7.8	--	13.2	1.4	8.6	5.9
20	79.8	10.5	48.2	14.5	2.7	--	33.2	1.3	6.7
25	67.8	8.1	51.3	19.7	8.6	2.6	24.0	3.5	17.1
30	81.1	4.4	62.3	35.5	12.8	3.2	30.9	2.5	10.6
35	93.9	5.0	77.9	41.9	17.8	5.1	28.8	3.2	12.3
40	98.6	3.5	83.8	48.3	16.3	4.4	38.2	.9	9.0
45	115.4	4.5	101.6	64.9	28.0	10.5	40.9	.7	16.9
50	131.5	4.7	115.6	85.8	41.8	17.2	44.4	3.2	19.0
55	96.2	8.3	78.4	55.9	20.3	5.5	31.6	3.0	34.4
60	104.4	4.9	90.7	61.9	29.4	8.5	35.7	5.4	6.7
65	132.7	3.9	120.9	94.4	60.3	30.8	45.2	--	14.8
70	123.7	7.3	117.5	85.7	52.8	21.4	37.2	--	9.0
75	108.5	--	102.4	77.8	60.1	10.8	61.3	--	26.8
80	133.0	7.6	118.4	99.4	52.9	18.1	54.7	1.1	43.4
									0.3
									23.3
									15.3
									44.3
									4.8

Table 20a.—Average empirical yields of timber for fully stocked stands

**Type:** Oak-hickory**Region:** Southeast

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre, by d.b.h. class (inches)			Volume per acre		
					Total			Saw-log portion		
		trees 5.0+ inches			aboveground trees 1.0+			International $\frac{1}{4}$ -inch rule		
10	27	917	33	--	--	7	347	59	94	--
15	39	1,173	92	12	--	25	911	99	336	43
20	14	1,577	117	23	5	--	1,446	137	551	150
25	31	1,365	199	40	7	1	67	2,101	83	1,125
30	55	1,280	221	44	8	2	76	2,279	78	1,310
35	44	1,154	213	55	13	3	82	2,474	110	1,472
40	80	860	234	76	19	4	99	2,864	77	1,878
45	73	871	240	76	21	4	102	2,997	88	1,987
50	67	854	228	78	21	5	102	3,023	87	2,035
55	60	706	213	85	30	8	110	3,200	70	2,195
60	59	664	212	92	33	9	114	3,402	86	2,394
65	37	642	205	88	33	8	111	3,296	88	2,367
70	55	608	182	94	40	14	117	3,640	124	2,612
75	26	733	193	82	38	13	113	3,581	147	2,526
80	27	608	189	87	43	16	125	3,784	138	2,748
										1,789

**Site:** Medium**Region:** Southeast

Stand age (years)	Sample plots	Number			Square feet			Cubic feet			Board feet		
					per acre			per acre			per acre		
		trees 5.0+ inches			aboveground trees 1.0+			error			portion		
10	27	917	33	--	--	--	7	347	59	94	--	--	--
15	39	1,173	92	12	--	--	25	911	99	336	43	241	241
20	14	1,577	117	23	5	--	37	1,446	137	551	150	859	859
25	31	1,365	199	40	7	1	67	2,101	83	1,125	309	1,736	1,736
30	55	1,280	221	44	8	2	76	2,279	78	1,310	380	2,169	2,169
35	44	1,154	213	55	13	3	82	2,474	110	1,472	515	2,942	2,942
40	80	860	234	76	19	4	99	2,864	77	1,878	712	4,103	4,103
45	73	871	240	76	21	4	102	2,997	88	1,987	771	4,428	4,428
50	67	854	228	78	21	5	102	3,023	87	2,035	814	4,708	4,708
55	60	706	213	85	30	8	110	3,200	70	2,195	6,356	6,356	6,356
60	59	664	212	92	33	9	114	3,402	86	2,394	1,241	7,168	7,168
65	37	642	205	88	33	8	111	3,296	88	2,367	1,237	7,198	7,198
70	55	608	182	94	40	14	117	3,640	124	2,612	1,584	9,197	9,197
75	26	733	193	82	38	13	113	3,581	147	2,526	1,481	8,595	8,595
80	27	608	189	87	43	16	125	3,784	138	2,748	1,789	10,284	10,284

Table 20b.--Average empirical yields of forest biomass for fully stocked stands

Type: Oak-hickory      Site: Medium      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group						
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums
Green tons per acre										
10	14.1	2.4	5.3	--	--	--	--	2.3	0.1	1.4
15	35.6	3.7	20.2	6.8	--	--	--	3.3	.7	6.1
20	57.3	5.0	30.6	15.8	5.6	--	--	4.9	--	5.4
25	81.9	3.2	60.4	29.4	10.1	3.7	9.3	1.4	14.2	13.2
30	89.5	3.0	69.9	36.1	14.5	7.1	9.9	.4	10.8	11.1
35	96.5	4.1	78.3	47.4	20.2	7.5	6.4	.8	13.1	20.2
40	112.6	2.8	99.9	68.2	31.8	12.6	6.1	.7	12.7	20.2
45	118.0	3.5	105.0	71.1	34.5	11.3	7.7	1.5	10.4	19.4
50	120.2	3.5	107.0	74.9	36.9	14.8	6.2	1.5	9.1	16.6
55	126.8	2.8	117.2	91.5	54.5	23.6	9.0	1.3	10.1	20.6
60	135.1	3.2	125.6	101.7	61.2	26.6	5.8	3.2	9.1	20.0
65	132.2	3.5	125.0	102.1	63.7	27.9	4.6	1.0	10.4	17.6
70	145.6	5.0	137.2	119.9	83.2	42.7	4.9	2.5	10.2	20.3
75	144.8	6.2	134.7	112.3	80.6	41.6	5.4	1.2	9.4	19.2
80	150.0	5.8	142.2	122.9	92.5	53.1	3.5	9.8	9.8	22.2
										78.6
										26.2

Table 21a.—Average empirical yields of timber for fully stocked stands

Table 21b.--Average empirical yields of forest biomass for fully stocked stands

Type: Oak-hickory			Site: High			Region: Southeast			
Stand age (years)	Total error	Standard	D.b.h. class (inches)			Species group			
						Yellow pines	Other softwood	Oaks	Hardwood
<u>Green tons per acre</u>									
10	22.5	4.5	14.1	6.4	--	3.7	--	1.9	6.6
15	28.3	8.9	21.5	11.1	5.2	--	3.9	4.8	5.9
20	79.3	8.7	70.7	39.6	22.7	11.1	3.7	0.7	8.9
25	94.5	9.5	74.6	44.0	13.8	2.7	12.4	1.2	21.0
30	110.8	6.1	97.0	71.2	38.0	15.1	8.3	.4	23.5
35	127.4	4.9	115.9	87.2	46.8	17.5	9.1	.8	24.9
40	133.2	4.5	122.7	96.7	55.9	21.8	12.0	.5	24.5
45	140.4	5.3	129.1	101.3	64.6	30.1	10.7	.1	27.3
50	134.2	3.8	125.3	99.4	62.5	28.8	6.1	3.3	21.8
55	158.1	5.5	147.8	125.5	90.0	48.7	12.5	1.2	29.7
60	158.8	6.3	150.6	132.9	97.6	56.5	10.8	.1	35.4
65	144.6	6.1	135.8	113.3	80.0	42.2	6.0	2.6	18.3
70	159.9	6.2	150.7	133.7	103.3	51.1	11.5	.1	26.1
75	189.2	12.9	184.1	167.5	130.3	79.4	6.8	1.1	49.6
80	174.8	8.7	168.1	155.1	126.7	82.9	8.0	1.0	17.7
									83.5
									32.7

Table 22a.—Average empirical yields of timber for fully stocked stands

**Type:** Oak-hickory      **Site:** Medium      **Region:** Coastal Plain

Table 22b.—Average empirical yields of forest biomass for fully stocked stands

Type: Oak-hickory                      Site: Medium                      Region: Coastal Plain

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group									
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hard hardwood
Green tons per acre													
10	12.1	2.8	5.5	--	--	--	--	2.3	--	1.9	2.3	4.6	1.0
15	36.1	4.4	20.6	8.1	--	--	--	3.2	0.2	7.2	4.7	15.6	5.1
20	38.2	5.1	16.8	7.6	2.4	--	--	4.8	--	8.3	2.8	19.4	2.9
25	82.5	6.4	63.1	30.5	11.1	3.6	9.7	--	--	18.2	13.4	36.3	4.8
30	91.1	6.7	74.3	42.5	19.7	11.7	9.8	.2	--	16.5	12.2	44.0	8.4
35	105.9	6.4	85.3	52.0	24.5	9.6	6.3	--	--	19.7	21.8	41.9	16.2
40	108.7	6.2	97.4	69.8	35.7	18.7	8.8	.3	--	19.9	16.7	46.4	16.7
45	112.7	8.1	100.7	69.3	34.7	13.1	8.2	.5	--	14.4	8.2	70.3	11.1
50	135.2	10.5	122.7	86.1	43.8	16.6	6.6	.5	--	21.8	15.2	77.2	14.0
55	127.9	5.3	120.2	99.3	64.7	31.1	11.5	.2	--	20.5	25.2	54.9	15.8
60	144.7	6.2	135.4	111.7	70.2	38.6	8.1	--	--	22.6	24.2	68.5	21.2
65	141.8	5.9	132.4	110.3	67.2	26.3	6.1	.5	--	30.4	18.3	57.5	28.9
70	164.6	18.0	159.9	144.9	114.3	73.8	5.3	--	--	16.3	15.9	106.5	20.5
75	151.7	11.6	139.7	116.3	82.4	44.1	9.1	1.0	17.3	11.8	90.1	22.3	
80	155.7	16.2	147.9	130.5	106.2	66.1	11.1	18.4	31.7	21.2	32.8	40.5	

Table 23a.—Average empirical yields of timber for fully stocked stands

## Type: Oak-hickory      Site: High      Region: Coastal Plain

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre,	Total trees 5.0+ inches	Standard aboveground error	Growing stock	Saw-log portion	Sawtimber International $\frac{1}{4}$ -inch rule	Volume per acre		
		1.0+	5.0+	9.0+		13.0+		17.0+			1.0+	1.0+	1.0+
Square feet													
10	3	1,135	42	8	--	--	15	548	140	278	88	490	
15	2	393	42	11	3	--	15	469	410	182	68	382	
20	1	766	165	17	12	3	60	1,854	--	1,285	587	3,278	
25	1	1,054	276	31	--	--	75	2,741	--	1,459	384	2,155	
30	6	1,135	206	71	29	7	99	2,913	394	1,952	1,036	5,929	
35	5	1,098	181	72	31	11	100	3,167	195	2,102	1,188	6,796	
40	7	780	206	98	45	12	127	3,833	266	2,772	1,713	9,720	
45	7	695	235	88	32	14	116	3,666	397	2,504	1,343	7,667	
50	3	474	221	101	25	8	121	3,439	263	2,555	1,347	7,576	
55	8	629	206	105	50	14	135	4,555	375	3,397	2,221	12,703	
60	4	593	203	96	34	11	120	3,809	351	2,832	1,891	10,784	
65	1	227	116	76	51	188	5,945	--	4,477	3,586	20,704		
70	2	595	194	81	45	12	116	3,412	350	2,432	1,629	9,413	
75	3	709	182	113	55	25	151	5,422	598	4,122	3,097	17,785	
80	3	408	141	77	53	26	139	4,611	880	3,124	2,578	14,809	

Table 23b.--Average empirical yields of forest biomass for fully stocked stands

Type: Oak-hickory                      Site: High                      Region: Coastal Plain

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group								
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks
10	22.2	5.5	13.7	6.2	--	--	4.6	--	1.4	3.9	12.3	--
15	18.4	16.1	12.8	7.5	3.4	--	3.1	--	5.1	2.5	7.5	0.1
20	72.0	--	64.2	29.2	24.6	9.7	12.5	--	25.9	--	28.8	4.9
25	110.7	--	79.0	25.4	--	--	8.0	--	23.6	0.1	79.0	--
30	110.2	13.5	94.8	70.8	42.9	18.5	12.2	--	35.6	34.0	21.3	7.1
35	125.1	7.2	114.0	89.0	60.6	28.1	10.4	--	31.0	11.2	64.4	8.0
40	149.4	11.4	139.0	116.8	80.8	35.4	19.6	--	27.3	15.5	85.2	1.9
45	142.7	16.5	130.7	103.8	65.0	36.9	11.6	0.8	31.1	32.2	54.4	12.7
50	128.9	10.7	124.3	96.3	41.6	21.0	20.7	--	31.1	12.0	61.9	3.3
55	175.3	13.2	166.2	143.9	102.6	46.3	15.1	2.0	61.0	29.5	57.9	9.7
60	147.6	11.9	139.5	120.7	81.7	46.1	15.9	--	52.1	12.0	60.7	6.9
65	219.5	--	219.5	201.0	179.7	147.3	--	--	48.8	145.0	15.9	9.8
70	134.6	11.0	129.5	110.5	87.1	42.8	7.6	--	28.9	11.4	46.8	39.9
75	210.9	28.1	204.8	192.0	146.1	91.8	12.9	2.9	93.4	19.2	72.5	10.1
80	182.1	36.4	178.2	166.5	145.8	103.6	20.0	--	43.8	10.3	99.2	8.9

Table 24a.--Average empirical yields of timber for fully stocked stands

Type: Oak-hickory      Site: Medium      Region: Piedmont

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)			Basal area: per acre, trees 5.0+ inches			Total aboveground trees 1.0+ inches			Growing stock: error			Saw-log portion: International $\frac{1}{4}$ -inch rule			Volume per acre Sawtimber		
		1.0+	5.0+	9.0+	13.0+	17.0+													
10	9	1,010	37	--	--	--	8	391	142	101	--	--	--	--	--	--	--	--	
15	19	1,205	105	10	--	--	27	972	175	357	35	199	199	1,078	1,078	1,078	1,078	1,078	
20	9	1,683	140	30	6	--	45	1,740	113	682	187	1,546	1,546	2,873	2,873	2,873	2,873	2,873	
25	18	1,465	192	39	5	1	65	2,075	72	1,119	272	1,546	1,546	3,865	3,865	3,865	3,865	3,865	
30	28	1,354	224	40	8	2	74	2,283	88	1,272	307	1,758	1,758	2,873	2,873	2,873	2,873	2,873	
35	24	1,137	202	53	12	3	77	2,272	147	1,356	502	1,758	1,758	2,873	2,873	2,873	2,873	2,873	
40	41	917	240	76	19	3	99	2,919	97	1,934	668	1,546	1,546	2,873	2,873	2,873	2,873	2,873	
45	43	860	238	81	23	4	104	3,099	127	2,067	836	4,796	4,796	2,873	2,873	2,873	2,873	2,873	
50	36	836	221	75	20	4	98	2,919	101	1,963	785	4,542	4,542	2,873	2,873	2,873	2,873	2,873	
55	26	760	203	84	30	9	107	3,182	90	2,239	1,127	6,521	6,521	2,873	2,873	2,873	2,873	2,873	
60	29	600	208	92	33	8	113	3,306	129	2,383	1,234	7,142	7,142	2,873	2,873	2,873	2,873	2,873	
65	13	603	188	87	38	10	112	3,325	130	2,437	1,409	8,212	8,212	2,873	2,873	2,873	2,873	2,873	
70	30	599	176	99	40	12	115	3,548	176	2,568	1,532	8,892	8,892	2,873	2,873	2,873	2,873	2,873	
75	11	562	180	84	43	14	114	3,604	225	2,571	1,588	9,225	9,225	2,873	2,873	2,873	2,873	2,873	
80	9	588	161	95	50	19	128	4,008	231	2,915	1,925	11,265	11,265	2,873	2,873	2,873	2,873	2,873	

Table 24b.—Average empirical yields of forest biomass for fully stocked stands

Type:	Oak-hickory			Site: Medium			Region: Piedmont						
Stand age (years)	Total	Standard error	D.b.h. class (inches)	5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hard hardwood
Green tons per acre													
10	15.9	5.7	6.6	--	--	--	--	2.8	--	1.0	1.2	8.5	2.3
15	37.2	6.6	21.6	6.4	--	--	--	3.8	1.4	6.3	11.1	9.5	5.1
20	67.9	3.9	38.2	20.4	7.5	--	--	5.0	--	3.8	18.9	30.4	9.8
25	81.2	3.0	58.3	27.9	8.1	3.1	9.2	1.0	13.4	12.1	30.2	15.3	
30	90.1	3.4	68.4	32.4	12.3	4.9	10.1	0.7	8.4	11.0	47.3	12.6	
35	88.5	5.5	71.6	44.5	18.9	6.6	7.5	.4	13.2	18.4	35.5	13.5	
40	116.2	3.9	102.1	68.4	30.3	9.0	5.9	.4	13.1	18.1	60.7	17.9	
45	122.0	5.1	108.1	76.3	36.8	11.1	8.9	1.8	13.2	19.6	61.7	16.9	
50	116.4	4.1	102.2	72.2	35.5	13.2	7.7	1.2	6.6	16.2	67.2	17.6	
55	127.2	3.6	117.4	93.1	56.2	26.0	8.2	.9	7.9	19.4	75.5	15.3	
60	131.7	5.0	123.9	100.4	60.2	24.0	6.8	1.9	7.5	20.5	76.4	18.6	
65	133.9	5.5	128.5	109.2	74.0	34.4	5.3	.2	6.7	23.1	73.5	25.2	
70	142.0	6.9	133.8	118.0	78.5	35.7	5.9	1.2	12.8	17.8	76.8	27.5	
75	145.4	9.4	135.6	116.6	88.0	46.1	4.8	.9	7.2	29.6	75.4	27.4	
80	164.2	9.6	158.1	144.2	113.9	63.8	3.5	.3	11.4	12.7	112.7	23.6	

Table 25a.—Average empirical yields of timber for fully stocked stands

Table 25b.--Average empirical yields of forest biomass for fully stocked stands

## Type: Oak-hickory

## Site: High

## Region: Piedmont

Stand age (years)	Total	Standard error	D.b.h. class (inches)			Species group					
			5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks Hard hardwood
			;	;	;	;	;	;	;	;	;
Green tons per acre											
10	14.9	5.5	2.7	—	—	—	3.1	—	3.5	3.2	4.0
15	41.8	—	33.9	21.4	13.8	—	9.3	—	8.8	11.8	9.6
20	84.1	13.9	77.0	44.1	25.1	15.9	1.0	—	5.6	39.9	18.3
25	107.6	12.7	88.4	46.2	15.7	6.3	11.9	2.8	40.3	26.7	11.2
30	110.1	6.9	96.4	68.8	36.1	18.9	7.5	1.0	26.9	27.1	31.8
35	124.9	5.0	114.1	84.5	44.1	13.7	9.2	0.3	24.8	31.1	44.5
40	122.7	4.8	111.5	85.7	44.8	13.4	11.4	—	23.2	34.2	37.0
45	139.4	6.1	128.6	100.9	65.7	29.8	9.0	—	30.4	36.2	49.9
50	135.7	5.5	128.8	102.6	67.8	30.8	5.1	.7	29.0	32.0	43.0
55	148.6	8.0	136.7	115.2	84.8	47.8	12.0	—	22.0	40.4	50.1
60	158.1	12.5	149.8	131.1	94.3	52.5	11.3	—	24.3	33.0	52.1
65	139.0	4.3	129.1	106.8	72.4	40.1	9.3	—	24.3	32.3	46.4
70	164.4	7.8	154.6	137.9	109.3	56.4	14.7	—	31.4	52.0	31.6
75	178.6	17.7	173.5	157.0	123.6	73.1	5.2	—	11.1	77.9	47.7
80	174.3	5.6	165.5	151.3	117.9	73.1	9.8	—	6.6	42.1	71.4

Table 26a.--Average empirical yields of timber for fully stocked stands

**Type:** Oak-hickory      **Site:** Medium      **Region:** Mountain

		Live trees per acre, by d.b.h. class (inches)		Basal area per acre,		Total trees 5.0+ inches		Standard aboveground error		Growing stock		Saw-log portion		Sawtimber	
Stand age (years)	Sample plots	1.0+	5.0+	9.0+	13.0+	17.0+	trees 1.0+	trees 1.0+	trees 1.0+	trees 1.0+	trees 1.0+	trees 1.0+	trees 1.0+	trees 1.0+	trees 1.0+
Square feet															
10	5	1,276	20	--	--	--	5	404	122	57	--	--	--	--	
15	4	1,299	50	6	--	--	14	656	174	176	35	200	200	200	
20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
25	2	1,535	184	45	14	4	71	2,239	846	1,143	543	3,000	3,000	3,000	
30	7	1,267	232	51	7	2	78	2,079	128	1,203	293	1,666	1,666	1,666	
35	7	1,122	251	58	10	2	94	2,709	290	1,676	528	3,010	3,010	3,010	
40	17	800	233	75	18	4	98	2,748	121	1,838	669	3,862	3,862	3,862	
45	19	879	266	69	20	5	105	2,871	130	1,865	628	3,607	3,607	3,607	
50	16	773	218	75	18	6	99	2,864	113	1,912	706	4,084	4,084	4,084	
55	16	668	249	86	25	4	112	3,136	164	2,063	824	4,752	4,752	4,752	
60	17	772	221	92	31	8	112	3,334	146	2,222	1,044	6,005	6,005	6,005	
65	15	632	219	85	27	8	109	3,105	154	2,187	992	5,794	5,794	5,794	
70	16	710	203	88	38	13	116	3,565	111	2,516	1,419	8,209	8,209	8,209	
75	6	760	230	90	35	11	117	3,291	280	2,250	1,060	6,185	6,185	6,185	
80	13	604	211	84	36	14	120	3,519	190	2,503	1,508	8,626	8,626	8,626	

Table 26b.--Average empirical yields of forest biomass for fully stocked stands

Type: Oak-hickory

Site: Medium

Region: Mountain

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group							
				9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks
<u>Green tons per acre</u>											
10	16.6	5.1	2.7	--	--	1.6	0.5	0.7	3.5	4.5	5.7
15	25.6	6.6	11.4	3.9	--	0.7	--	.2	11.2	7.4	6.0
20	--	--	--	--	--	--	--	--	--	--	--
25	84.8	31.5	64.3	37.4	22.0	9.6	8.4	13.1	--	20.9	28.7
30	82.6	5.2	62.7	32.6	8.3	2.7	9.2	--	4.2	7.9	41.4
35	106.4	12.1	88.0	49.0	16.6	6.6	2.8	3.6	.4	23.4	49.5
40	108.7	4.9	98.0	65.8	30.5	13.3	2.8	2.2	2.3	29.6	51.4
45	112.0	5.1	100.7	60.2	29.4	10.5	4.6	1.5	1.8	25.3	56.5
50	114.8	4.6	103.2	70.6	33.4	16.9	2.6	3.0	2.6	18.7	65.4
55	124.9	6.7	113.5	80.3	40.2	11.4	7.5	3.3	1.9	17.4	75.9
60	133.7	5.6	121.2	96.1	55.9	22.0	2.2	7.7	1.6	15.9	78.3
65	124.9	6.1	117.7	91.0	52.7	23.3	3.2	1.9	1.5	12.5	77.1
70	141.6	4.5	130.8	109.4	74.6	38.4	3.0	6.2	1.8	27.6	77.7
75	133.2	12.0	125.7	98.5	64.4	29.5	.7	2.2	1.3	11.4	89.8
80	138.1	7.0	128.9	105.3	72.4	40.7	.5	13.1	.2	29.2	72.6
											22.4

Table 27a.—Average empirical yields of timber for fully stocked stands

## Type: Oak-hickory      Site: High      Region: Mountain

Stand age (years)	Sample plots	Live trees per acre,			Basal area per acre, trees 5.0+ inches	Total aboveground trees 1.0+	Standard error	Growing stock	Saw-log portion	Sawtimber
		1.0+	5.0+	9.0+						
Square feet										
10	1	248	148	35	--	49	991	--	519	39
15	1	704	103	11	--	30	850	--	395	75
20	1	1,481	81	19	--	38	1,735	--	997	615
25	2	881	161	66	9	--	66	2,043	456	1,222
30	4	714	249	109	38	6	123	3,604	297	2,619
35	3	656	222	103	14	3	105	3,187	315	2,263
40	6	567	240	113	36	11	129	4,030	521	3,042
45	3	823	289	108	35	--	126	3,530	635	2,546
50	12	829	217	92	28	8	109	3,272	153	2,249
55	5	459	206	102	43	12	133	4,181	207	3,097
60	5	501	161	78	51	19	122	3,912	290	2,797
65	6	599	218	93	46	10	124	3,645	310	2,632
70	1	693	193	112	65	31	154	4,640	--	3,534
75	--	--	--	--	--	--	--	--	--	--
80	3	456	202	99	49	18	134	3,875	510	2,444
									1,530	8,902

Table 27b.—Average empirical yields of forest biomass for fully stocked stands

Type: Oak-hickory				Site: High				Region: Mountain					
Stand age (years)	Total 1.0+ (years)	Standard error	D.b.h. class (inches)	5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hard hardwood
10	38.6	--	37.8	19.5	--	--	2.1	--	--	21.4	--	15.2	
15	34.6	--	26.4	8.0	--	--	--	--	0.2	6.8	22.6	5.1	
20	64.4	--	43.6	31.6	31.6	--	--	5.6	--	41.3	--	17.4	
25	78.3	22.7	60.0	45.7	13.3	--	11.2	--	--	25.9	24.4	16.8	
30	137.2	10.7	124.8	99.4	51.8	12.9	3.3	--	1.8	76.4	21.6	34.0	
35	119.4	11.8	105.2	79.9	23.1	8.4	1.6	5.2	.7	74.1	--	37.8	
40	153.3	18.3	146.5	124.9	71.2	31.4	2.9	3.6	2.0	77.6	33.5	33.8	
45	131.2	24.9	116.2	86.4	39.1	--	6.5	--	3.6	72.4	25.1	23.6	
50	127.4	6.1	114.0	89.0	50.9	23.1	2.7	11.0	1.8	33.3	53.5	25.1	
55	165.3	10.8	158.9	136.5	91.7	42.7	--	5.6	1.0	53.3	38.0	67.4	
60	151.5	11.2	141.6	123.9	102.0	53.0	--	--	.6	60.1	49.6	41.1	
65	143.4	12.1	135.4	111.7	78.5	28.7	0.4	8.3	1.3	40.5	69.2	23.6	
70	180.4	--	174.8	163.8	134.1	82.9	--	0.8	--	78.0	61.5	40.0	
75	--	--	--	--	--	--	--	--	--	--	--	--	
80	153.2	20.1	145.8	131.3	97.5	57.4	--	--	5.3	4.1	20.3	111.1	12.5

Table 28a.--Average empirical yields of timber for fully stocked stands

Type: Oak-gum-cypress      Site: Medium      Region: Southeast

Stand age (years)	Sample plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre,			Total			Growing stock			Volume per acre		
		1.0+			5.0+			13.0+			17.0+			Sawtimber		
		:			:			:			:			:		
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Board feet
10	7	1,202	22	—	—	—	—	5	350	104	85	—	—	—	—	—
15	7	1,520	27	6	—	—	—	9	796	225	117	38	197	—	—	—
20	16	2,294	191	29	3	—	—	52	2,096	226	746	189	991	—	—	—
25	23	2,020	246	46	10	3	85	2,797	237	1,340	445	2,449	—	—	—	—
30	46	1,566	293	59	13	4	103	3,233	191	1,714	550	3,067	—	—	—	—
35	62	1,264	308	80	21	6	117	3,421	144	1,959	733	4,098	—	—	—	—
40	87	1,052	312	96	29	8	136	3,801	128	2,351	1,016	5,668	—	—	—	—
45	82	973	299	102	28	7	134	3,812	147	2,411	1,042	5,843	—	—	—	—
50	110	975	304	110	32	9	145	4,052	123	2,530	1,194	6,677	—	—	—	—
55	79	872	275	111	40	10	145	4,126	142	2,680	1,351	7,616	—	—	—	—
60	108	886	296	122	41	11	155	4,530	135	3,014	1,603	8,955	—	—	—	—
65	70	843	310	133	50	15	171	4,800	170	3,225	1,864	10,410	—	—	—	—
70	63	877	280	139	56	18	174	5,126	216	3,462	2,104	11,788	—	—	—	—
75	49	877	293	129	55	18	173	4,950	208	3,271	1,928	10,817	—	—	—	—
80	48	879	280	131	58	21	176	5,062	246	3,468	2,188	12,267	—	—	—	—

Table 28b.--Average empirical yields of forest biomass for fully stocked stands

Type:	Oak-gum-cypress	Site: Medium	Region: Southeast
Stand age (years)	Total : 1.0+ error	D.b.h. class (inches) : 5.0+ : 9.0+ : 13.0+ : 17.0+ : Pines : softwood	Species group : Soft : Gums : hardwood
10	13.1	3.6	3.8
15	30.9	8.6	6.3
20	73.3	8.0	36.0
25	98.7	8.4	66.6
30	113.3	6.7	86.3
35	118.1	4.6	97.4
40	131.4	4.7	115.5
45	132.9	5.2	117.8
50	141.8	4.3	126.6
55	143.9	4.9	130.0
60	159.5	4.9	146.3
65	170.4	6.3	158.7
70	180.9	7.5	169.1
75	174.0	7.5	161.6
80	181.2	9.6	170.6
			Green tons per acre
			--
			2.2
			3.8
			5.2
			7.9
			10.1
			13.4
			16.4
			19.9
			22.7
			29.5
			38.3
			46.4
			49.7
			53.0
			56.3
			59.9
			63.3
			66.3
			70.8
			74.8
			78.1
			82.9
			86.1
			90.2
			94.2
			97.5
			10.5

Table 29a.--Average empirical yields of timber for fully stocked stands

Table 29b.—Average empirical yields of forest biomass for fully stocked stands

Type: Oak-gum-cypress      Site: High      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group									
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hardwood
Green tons per acre													
10	23.4	6.0	8.9	7.8	--	--	--	2.6	--	8.2	7.1	5.0	0.5
15	58.9	39.0	39.2	16.5	5.2	--	--	10.5	--	30.2	9.4	8.6	.1
20	84.8	6.0	69.4	45.0	26.4	17.0	3.6	--	--	13.8	33.5	28.7	5.1
25	118.8	8.0	96.7	54.3	30.3	11.9	12.9	--	--	57.3	19.5	26.2	2.9
30	130.1	7.2	108.3	77.2	42.4	14.7	7.4	0.3	54.5	49.0	13.6	5.3	
35	133.6	5.1	121.4	91.9	47.0	21.2	9.3	5.9	51.3	42.3	16.4	8.4	
40	153.7	7.6	142.1	115.2	67.3	34.7	5.7	12.4	71.4	40.2	13.6	10.4	
45	159.2	6.5	147.3	119.9	77.2	34.8	6.9	3.9	65.7	36.1	35.3	11.4	
50	167.0	6.1	155.7	130.9	85.9	41.2	8.5	10.8	68.5	42.2	26.8	10.2	
55	159.6	7.9	149.1	128.7	91.5	47.0	11.9	4.6	65.4	36.7	32.5	8.5	
60	173.0	6.9	163.4	137.2	96.3	47.3	7.9	11.7	77.8	35.4	28.1	12.1	
65	177.4	10.3	169.2	149.9	113.5	63.6	5.3	6.8	77.5	27.3	43.8	16.6	
70	199.2	14.3	190.8	167.9	124.6	68.0	7.0	28.3	108.7	23.0	14.2	18.0	
75	214.0	27.4	203.9	182.9	144.7	102.1	7.5	38.4	99.0	28.1	26.4	14.6	
80	187.4	14.3	178.0	160.3	135.0	99.0	3.4	24.2	93.0	32.7	24.3	9.9	

Table 30a.--Average empirical yields of timber for fully stocked stands

## Type: Natural yellow pine      Site: All sites      Region: Southeast

Stand age (years)	Sample Plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre,			Total			Growing stock			Volume per acre		
		1.0+			5.0+ : 9.0+			13.0+ : 17.0+			trees 5.0+ inches			Saw-log portion		
		:	:	:	:	:	:	:	:	:	error	error	error	Saw-log portion	Saw-log portion	Saw-log portion
<u>Square feet</u>																
10	58	1,220	69	--	--	--	--	14	683	68	158	--	--	--	--	
15	97	1,420	167	13	--	--	--	41	1,341	78	566	71	378			
20	166	1,475	245	27	2	--	--	66	1,975	55	1,005	221	1,171			
25	267	1,075	292	55	7	1	94	2,612	50	1,704	662	3,505				
30	326	972	284	77	13	2	106	2,963	54	2,112	1,061	5,616				
35	278	988	283	85	17	2	111	3,225	61	2,348	1,292	6,841				
40	247	841	261	92	22	3	114	3,384	71	2,555	1,573	8,337				
45	175	818	245	98	27	4	115	3,481	82	2,679	1,825	9,670				
50	102	813	241	104	31	6	119	3,811	121	2,979	2,153	11,410				
55	65	816	237	113	33	5	124	3,895	126	3,008	2,207	11,703				
60	48	1,006	232	100	28	5	114	3,530	140	2,689	1,981	10,498				
65	26	829	230	109	40	8	128	4,180	296	3,315	2,582	13,699				
70	15	683	203	116	37	4	122	3,853	215	3,141	2,515	13,317				
75	10	788	172	123	54	11	133	4,703	483	3,853	3,551	18,785				
80	10	1,027	251	119	46	6	137	4,279	582	3,345	2,522	13,363				

Table 30b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural yellow pine      Site: All sites      Region: Southeast

Stand age (years)	Total	Standard	D.b.h. class (inches)	Species group								
				5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks
-- -- -- -- -- -- -- -- -- -- Green tons per acre -- -- -- -- --												
10	25.0	2.5	9.3	--	--	--	--	22.6	0.2	0.5	0.6	0.5
15	49.3	2.8	28.6	5.3	--	--	--	44.4	.2	1.7	1.0	1.4
20	73.0	2.0	49.4	13.7	2.2	--	--	64.7	.5	2.6	1.8	2.1
25	97.2	1.9	80.2	36.2	9.9	2.7	87.6	1.0	2.8	2.8	2.3	2.5
30	110.3	2.0	96.6	56.1	17.9	4.3	98.3	.6	4.3	4.3	2.9	2.9
35	119.7	2.3	105.8	66.8	23.4	4.6	106.2	.6	4.4	3.5	3.3	1.6
40	125.7	2.6	114.0	79.3	32.7	7.7	109.6	1.2	5.2	3.3	4.1	2.3
45	129.3	3.0	118.8	89.6	41.4	10.6	113.9	.7	5.0	4.0	4.2	1.5
50	141.8	4.5	131.0	103.5	52.1	14.5	124.1	1.2	5.5	4.1	4.2	2.6
55	143.9	4.4	133.1	108.3	51.5	12.6	123.1	1.1	6.3	4.4	5.7	3.4
60	130.9	5.2	118.2	93.8	47.5	14.6	110.7	.6	5.4	5.6	5.7	2.9
65	155.0	11.3	145.6	120.7	72.1	23.3	131.0	.4	5.5	4.9	9.9	3.3
70	145.5	8.7	138.0	119.2	58.1	10.3	132.4	.7	4.5	1.6	4.2	2.2
75	172.8	17.1	165.4	155.7	102.9	38.4	154.4	.3	7.1	4.2	2.3	4.5
80	156.3	20.3	145.5	120.3	71.2	16.0	124.2	10.0	4.6	11.4	3.3	2.8

Table 31a.—Average empirical yields of timber for fully stocked stands

Table 31b.--Average empirical yields of forest biomass for fully stocked stands

Type: Planted yellow pine      Site: All sites      Region: Southeast

Stand age (years)	Total	Standard error	D.b.h. class (inches)	Species group						
				Yellow pines			Other softwood			
				13.0+	17.0+	17.0+	softwood	hardwood	Oaks	Hard
Green tons per acre										
10	22.6	1.1	7.9	--	--	--	21.3	--	0.4	0.5
15	54.4	1.7	38.0	4.1	--	--	52.4	0.1	.4	.5
20	81.6	1.9	68.2	13.8	1.1	--	78.5	.1	.7	.5
25	101.5	2.5	93.3	35.5	3.3	0.3	98.8	--	.9	.3
30	111.5	5.8	105.0	64.3	12.0	.5	107.9	.7	1.7	1.2
35	113.7	12.4	103.5	69.7	23.2	2.0	109.8	--	.8	.6
40	139.9	14.0	134.3	113.8	53.0	5.1	131.8	--	1.7	.5
45	--	--	--	--	--	--	--	--	1.0	5.0
50	--	--	--	--	--	--	--	--	--	--
55	--	--	--	--	--	--	--	--	--	--
60	--	--	--	--	--	--	--	--	--	--
65	--	--	--	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--	--	--	--
75	--	--	--	--	--	--	--	--	--	--
80	--	--	--	--	--	--	--	--	--	--

Table 32a.—Average empirical yields of timber for fully stocked stands

Type:	Natural oak-pine	Site: All sites						Region: Southeast					
Stand age (years)	Sample Plots	Live trees per acre, by d.b.h. class (inches)			Basal area per acre, by d.b.h. class (inches)			Total aboveground growing stock, by d.b.h. class (inches)			Volume per acre		
		1.0+	5.0+	9.0+	13.0+	17.0+	trees 5.0+	trees 1.0+	trees 1.0+	error	portion	Sawtimber	International $\frac{1}{4}$ -inch rule
		Number						Square feet					
		939	39	--	--	--	9	433	72	112	--	--	--
10	23	1,338	97	13	--	--	26	951	100	388	74	397	397
15	25	1,591	203	30	4	--	61	1,984	100	995	257	1,412	1,412
20	36	1,361	205	38	9	1	68	2,014	124	1,106	406	2,188	2,188
25	39	1,172	246	60	16	4	92	2,672	105	1,729	806	4,368	4,368
30	73	1,095	235	66	17	4	95	2,807	107	1,797	896	4,878	4,878
35	75	1,032	229	69	19	5	97	2,913	97	1,953	1,028	5,592	5,592
40	83	944	236	78	24	7	107	3,155	90	2,189	1,219	6,693	6,693
45	73	958	241	90	26	7	114	3,477	114	2,415	1,393	7,591	7,591
50	67	875	212	81	28	7	106	3,268	142	2,315	1,390	7,617	7,617
55	49	943	230	85	30	8	112	3,462	148	2,342	1,460	7,965	7,965
60	47	994	202	84	34	10	114	3,549	217	2,442	1,705	9,353	9,353
65	22	746	221	86	37	15	124	3,900	194	2,877	2,126	11,667	11,667
70	31	788	181	85	38	9	107	3,332	219	2,410	1,784	9,721	9,721
75	11	969	217	93	37	11	121	3,897	331	2,805	1,919	10,537	10,537

Table 32b.--Average empirical yields of forest biomass for fully stocked stands

Type: Natural oak-pine				Site: All sites				Region: Southeast			
Stand age (years)	Total	Standard error	D.b.h. class (inches)	5.0+	9.0+	13.0+	17.0+	Yellow pines	Other softwood	Gums	Species group
Green tons per acre											
10	16.5	2.7	5.5	--	--	--	--	5.9	0.7	4.9	1.6
15	36.2	3.8	19.5	6.7	--	--	--	14.0	1.8	8.0	2.0
20	74.3	3.7	50.0	19.3	5.5	--	--	29.0	4.4	9.4	5.7
25	75.3	4.5	55.7	26.7	10.9	2.7	31.4	3.2	12.8	13.7	4.3
30	99.8	3.8	83.0	49.7	23.6	8.8	41.2	1.9	19.9	12.0	14.0
35	104.7	3.9	88.2	57.1	27.5	10.7	39.4	5.6	18.7	11.5	14.0
40	109.6	3.6	94.1	63.4	31.7	12.6	41.7	4.2	14.9	12.9	14.4
45	118.6	3.3	105.5	75.4	42.5	19.3	43.0	4.9	17.9	14.1	14.4
50	129.3	4.2	114.3	85.3	45.1	18.5	46.7	7.0	25.0	16.3	16.9
55	123.6	5.2	110.6	84.8	49.1	19.9	41.2	6.5	14.9	16.9	16.9
60	129.9	5.3	115.4	88.1	52.7	21.5	48.2	5.1	21.9	13.2	13.2
65	134.6	8.3	119.4	96.7	64.9	31.8	44.1	11.1	19.8	14.3	13.2
70	147.4	7.0	137.1	113.3	81.2	48.6	53.8	5.0	24.6	20.2	20.2
75	127.8	8.2	119.0	101.3	69.4	26.4	51.1	4.7	12.0	11.2	11.2
80	145.0	12.7	131.6	108.8	72.1	34.4	51.0	8.0	22.9	27.4	27.4

Table 33a.--Average empirical yields of timber for fully stocked stands

Type: Oak-hickory		Site: All sites										Region: Southeast					
		Live trees per acre, by d.b.h. class (inches)		Basal area per acre,		Total		Growing stock		Volume per acre		Sawtimber					
Stand age (years)	Sample plots	trees 5.0+	trees 5.0+	aboveground	trees 1.0+	error	error	portion	portion	Board feet	Cubic feet	Board feet					
10	34	967	35	--	--	8	359	53	97	--	--	--	227				
15	50	1,160	86	11	--	23	857	86	306	40			872				
20	24	1,505	119	21	5	--	1,434	107	579	153			1,910				
25	43	1,345	199	43	7	2	68	2,125	77	1,159	339		2,825				
30	85	1,185	217	50	12	3	79	2,377	79	1,422	494		4,188				
35	76	1,036	220	66	17	4	92	2,764	97	1,781	732		5,142				
40	132	828	232	79	23	5	104	3,032	71	2,051	896		5,392				
45	121	828	236	79	25	6	107	3,149	81	2,135	940		5,674				
50	121	774	226	82	25	7	107	3,150	66	2,165	985		7,656				
55	109	695	216	85	33	10	114	3,440	81	2,427	1,332		8,218				
60	91	680	206	91	35	11	116	3,543	86	2,515	1,426		7,311				
65	65	643	205	85	33	10	111	3,300	90	2,361	1,263		9,032				
70	79	635	185	91	39	13	116	3,588	103	2,581	1,558		9,486				
75	39	691	199	90	39	14	120	3,783	149	2,708	1,636						
80	45	568	185	90	45	18	128	3,973	126	2,856	1,908		11,010				

Table 33b.—Average empirical yields of forest biomass for fully stocked stands

Type: Oak-hickory				Site: All sites										Region: Southeast			
Stand age (years)	Total	Standard error	D.b.h. class (inches)									Species group					
				5.0+	9.0+	13.0+	17.0+	pines	Yellow pines	Other softwood	Gums	Soft hardwood	Oaks	Hardwood			
10	14.6	2.1	5.4	--	--	--	--	--	2.5	0.1	1.5	2.5	6.1	1.9			
15	33.5	3.2	18.5	6.4	--	--	--	3.0	.6	5.3	8.7	11.6	4.4				
20	56.4	3.9	31.2	14.9	5.8	--	--	4.3	.2	4.9	15.4	24.5	7.1				
25	82.7	2.9	61.4	32.0	11.1	4.0	9.5	1.6	13.9	14.4	32.4	10.8					
30	92.6	2.9	73.9	42.6	19.4	8.5	8.8	.4	13.4	18.4	39.2		12.5				
35	107.0	3.6	91.5	61.3	29.8	11.1	7.5	.8	17.4	25.5	40.2		15.6				
40	118.0	2.6	105.5	75.3	38.9	15.3	7.8	.6	16.1	25.3	51.0		17.1				
45	122.9	3.1	110.5	78.6	43.0	17.1	8.4	1.0	15.4	25.4	56.8		15.9				
50	124.0	2.6	112.3	82.4	45.1	19.4	6.4	2.1	13.7	22.6	60.1		19.1				
55	135.3	3.0	125.6	99.7	63.8	30.9	10.6	1.4	16.3	25.3	63.5		18.2				
60	139.8	3.2	129.9	107.3	69.0	33.9	7.2	2.4	16.1	23.7	67.8		22.5				
65	130.8	3.4	122.7	99.5	64.1	30.1	5.0	2.0	11.6	23.2	63.7		25.2				
70	142.9	4.1	134.3	116.1	80.9	40.5	5.9	2.1	12.8	22.3	75.5		24.4				
75	151.6	5.9	142.5	120.9	84.9	45.4	6.0	1.1	16.6	22.1	80.9		24.9				
80	157.6	5.1	150.1	132.8	102.0	61.7	5.1	6.2	12.2	24.9	81.0		28.2				

Table 34a.--Average empirical yields of timber for fully stocked stands

Table 34b.--Average empirical yields of forest biomass for fully stocked stands











**McClure, Joe P.; Knight, Herbert A.**  
Empirical yields of timber and forest biomass in the Southeast. Pap. SE-245. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1984. 75 p.

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Measurements and classifications recorded at 24,775 Forest Survey plots established randomly throughout the Southeast comprise a vast source of information on timber stand development. Raw, empirical yield tables developed from this source are reported for major forest types in the Region. These tables also serve as guides to yields of forest biomass by tree size and species group.

**KEYWORDS:** Southeast, yield tables, forest biomass.

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